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TO EXCAVATION

About Excavating Projects — By Excavating Men —
For Excavating Men — The World Over

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Mackie-Thompson-Tamm, Inc., complete several rush piledriving jobs, including that for the Leaning Asinelli Tower of Bologna in the Italian Village.

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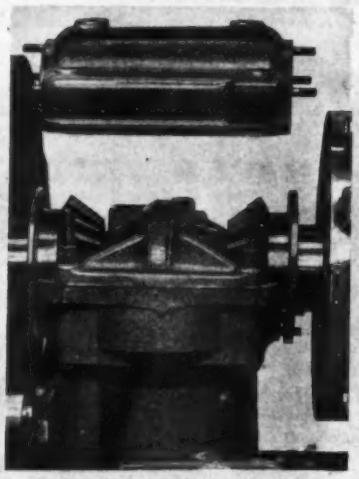
THE EXCAVATING ENGINEER PUBLISHING COMPANY

F. O. WYSE, *Managing Editor* — ARNOLD ANDREWS, *Editor* — E. M. HEUSTON, *Advertising Manager*

Modern Bucyrus-Eries give long-life service



Where bevel gears are used for reversing the propelling and swinging motions, this simple, long-life construction is used on modern Bucyrus-Erie machines.

When gasoline and Diesel excavators were first introduced, their life expectancy was far shorter than the old steamers they displaced. But step by step Bucyrus-Erie has built into modern excavators the long life and sturdy dependability for which their famous steamers were outstanding.

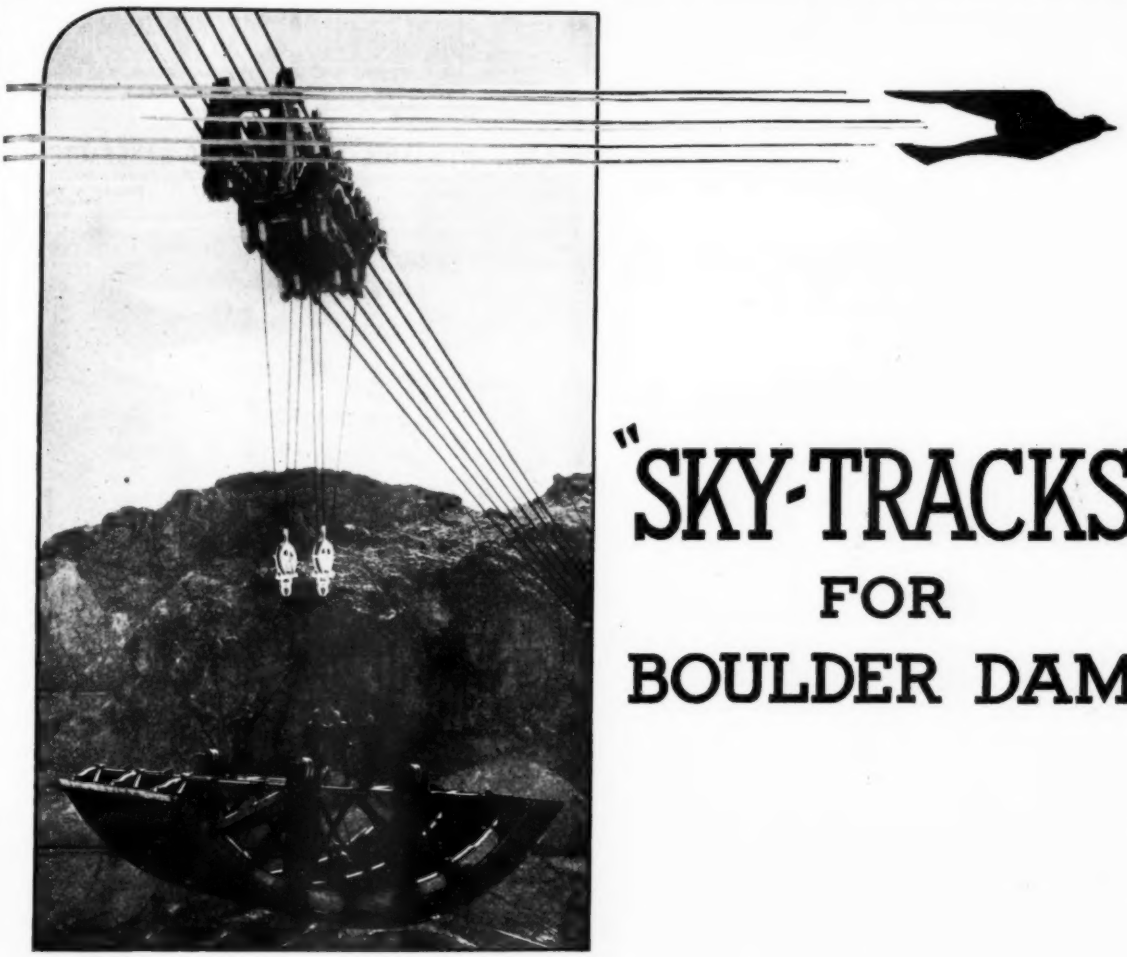
As you look over these up-to-date machines, at every point you see evidence of this long life construction. Look, for example, at these reversing bevel-gears for swinging and propelling. Note the ruggedness of the massive casting in which they are held in lasting alignment by large, long wearing ball-bearings. The entire assembly is completely enclosed and runs in oil.

When you compare balanced value, study the strength and endurance of this gear unit. Compare others with the dependable, long-life performance you can see in Bucyrus-Eries.

BUCYRUS-ERIE COMPANY
South Milwaukee, Wis.

781

THE AIR ROADS ARE ALWAYS OPEN



"SKY-TRACKS" FOR BOULDER DAM

The World's Heaviest Duty Permanent Cableway—150 Ton Capacity

HIGH above the Black Canyon of the Colorado River man has stretched a slender web of steel—built "Sky-Tracks" across the abyss that for centuries seemed impassable. The Lidgerwood Cableways—essential to the completion of Boulder Dam—represent spans of from 1365 to 2575 feet. To assure maximum service and economy—they are equipped with American Steel & Wire Company Track Cables. With breaking strengths in excess of 500 tons each—they enable safe and rapid movement of materials and supplies. In connection with your own aerial transportation problem—whether it be large or small—you will find American Steel & Wire Company quality and service of exceptional value. We invite you to correspond with us.

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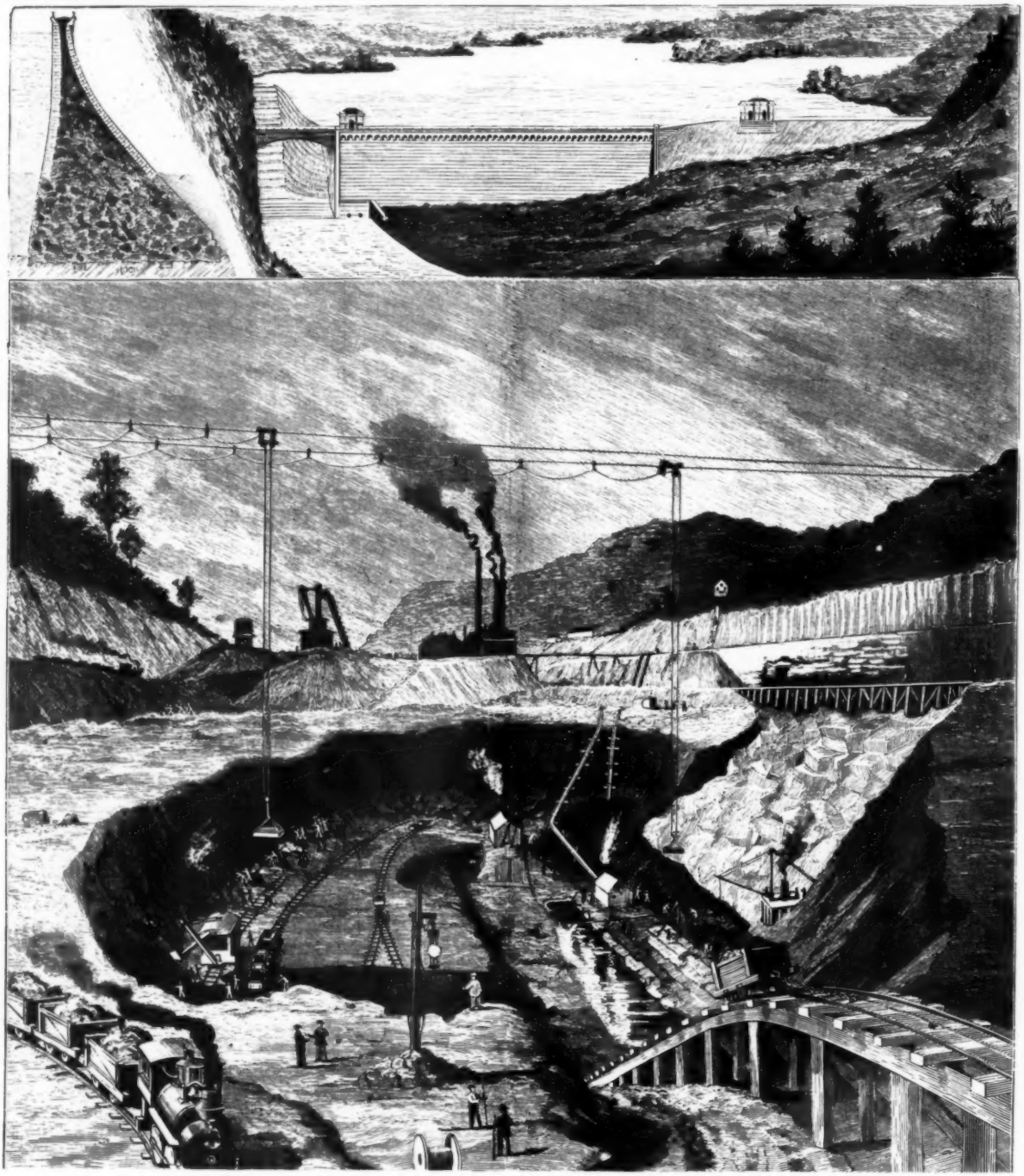

New York's Water Supply—Building the New Croton Dam in 1896. See story on page 325.

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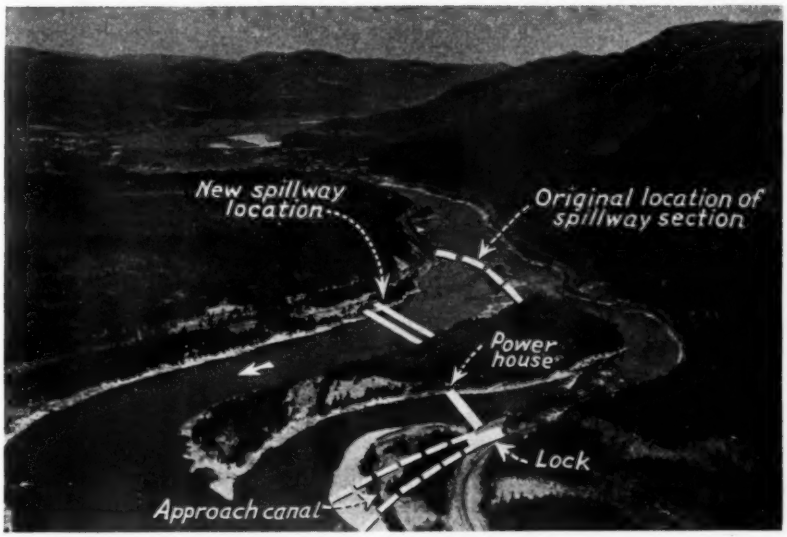


PHOTO COURTESY ENGINEERING NEWS-RECORD

Aerial view of the Bonneville Dam site on the Columbia River looking upstream with the principal features of the project sketched in. The powerhouse and lock are on the Oregon side.

Coffer-damming the Columbia at Bonneville

Guy F. Atkinson Company battles the river and makes good time on the Bonneville Dam job

By GEO. C. McNUTT

SEVEN MONTHS and eight days in which to excavate and move 849,000 yards of rock and dirt!

That's the job the Guy F. Atkinson Company tackled at Bonneville Dam on February 16 of this year; 45 days later Atkinson crews had already moved 200,000 yards of the total and in doing so won a nip-and-tuck battle with the Columbia River. The contract must be completed by September 25.

From the very beginning the Columbia River has always been a potent obstacle to progress. In December and January its high waters washed out cofferdams and forced a complete cessation of work being done at Bonneville by another contractor. During that period, however, the U. S. Engineers made additional borings in the river and found an advantageous rock dike extending across the river from Bradford Island to the Washington shore 3,000 feet below the original site. The first location was abandoned, contracts revised, new bids called for, and nearly $3,000,000 saved because less construction was required at the new site.

EDITOR'S NOTE—The first Federal power development on the Columbia River was made possible when the PWA allocated approximately $20,000,000 last fall to the War Department for the construction of the Bonneville Dam. Forty miles up the river from Portland, the Columbia flows through a comparatively narrow gorge and is divided into two channels by Bradford Island. Army engineers selected this as the best site for the dam. When completed, the dam will have a head of 62 feet providing power for an initial installation of 90,000-KW capacity. A maximum installation of 540,000-KW is provided for. In addition, barge navigation facilities are provided by a canal and locks.

Guy F. Atkinson Company awarded contract

Following the award of the new contract, Guy F. Atkinson Company moved in on the south half of the Bonneville Power and Navigation project to excavate for the powerhouse, the powerhouse dam, and the canal locks which will carry river traffic around the dam. (The north half of the project, that is the main spillway dam, was recently awarded to the Columbia Construction Company, Reno, Nevada.)

Digging material on Bradford Island for use in the upper cofferdam fill. The Bucyrus-Erie 43-B shovel is loading into a Sterling truck. In the background can be seen the lower cofferdam and the barge-mounted Diesel dragline.

Atkinson's well-organized crews went to work quickly and systematically. They cleared Bradford Island, which forms the connecting link between the north and south halves of the job. Their plans called for the construction of two cofferdams, one above and one below the powerhouse site, across the south channel between the island and the Oregon shore. When these cofferdams are complete, the 25-acre area in between, estimated to contain 850 acre-feet of water, will be pumped dry and the main excavation on the powerhouse site begun.

Fortunately part of the powerhouse site is located on Bradford Island, thus making it possible to use waste material from it for the cofferdam fills. One Bucyrus-Erie 43-B gas shovel with a 1¾-yard bucket and a fleet of Macks and Sterlings are supplying the material to the cofferdam fills, while two Allis-Chalmers tractors equipped with LeTourneau bulldozers keep the fill leveled and graded.

Spring flood threatens destruction

Heavy spring rains, swelling the Columbia, forced this crew to the utmost the last two days in March, when the river rose to within six inches of the top of the upper cofferdam fill and threatened to wipe out both cofferdams and forty-five days' work. The truck roads were a quagmire, but the tractors kept the trucks on the move, and with three Linns, rented from the General Construction Company to help negotiate the mud, the men and equipment battled inch for inch with the rising Columbia. Throughout the night of March 31 the crews moved and placed earth at a terrific rate, only to find the river still pacing them. But Easter morning the Columbia surrendered and dropped. Good equipment and strong men had won another battle over floods.

Good progress being made

By the time this story is published, the cofferdams will be finished.

To dig the core-trench along the lower cofferdam, a Bucyrus-Erie 50-B Diesel-powered 2-yard dragline has been mounted on a barge anchored to the dam. Changes in location of the barge are made by means of a donkey-engine and cable.

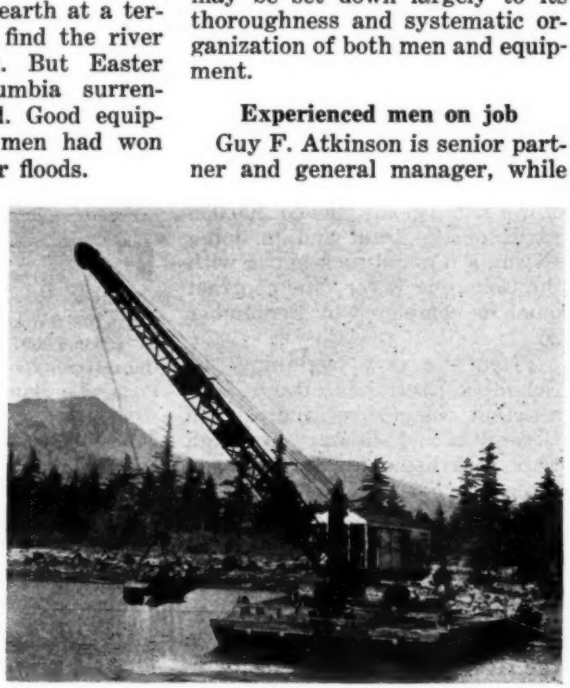
Meanwhile two Bucyrus-Erie 50-B steam shovels and a 75 Thew-Lorain are tearing into the rocky canal-lock excavation. Here again it has been possible to make use of much of the excavated material, this time in the construction of roadways, many of them for permanent use, at the dam site. Macks and Sterlings operated by the contractor, and Macks, Sterlings and Morelands, rented from Brown-Camillo and S. H. Newell, are doing the hauling.

To drill the rock on this work the Atkinson Company has erected a compressor shed, which houses one 1000-foot, two 750-foot, and one 600-foot Ingersoll-Rand air-compressors. Air is run to the jackhammers and drills on the job through a six-inch line.

This compressor shed is typical of Atkinson operations. In fact the speed achieved by the firm may be set down largely to its thoroughness and systematic organization of both men and equipment.

Experienced men on job

Guy F. Atkinson is senior partner and general manager, while



Digging the core-trench with a Bucyrus-Erie 50-B, Atlas Imperial Diesel-powered dragline mounted on a barge.

George Atkinson, junior partner in the company, is resident manager. Ray H. Northcutt, who had charge of the Monterey breakwater job for Atkinson, is assistant manager. The superintendent is J. F. Sinfield, formerly a mining engineer and excavation superintendent on many western projects, and long an Atkinson employee. D. E. Root is chief engineer; Wm. Ellis, assistant superintendent; Louis Armstrong, blasting superintendent; C. E. Ferguson, master mechanic. In addition to these men, each type of equipment is in charge of a superintendent, directly responsible to his superiors for the condition of the equipment and the training of the operators under him.

A general view of the repair sheds for servicing the equipment. The tall building near the water tower contains an overhead crane which is used for assembling bodies on the trucks and other important jobs.

Four 5-hour shifts used

Excavation operations are carried on twenty hours a day in four 5-hour shifts. The company officials say they believe they get more and better work done with the shorter shifts, for the men are fresher and there is little or no fatigue-lag in the closing hours of the shift. During the off hours a graveyard shift services shovels, tractors, trucks, etc.

The Atkinson Company is a great believer in the servicing of machines. They do not tolerate abusive pounding to achieve results. A very complete workshop is available and used for repairs. This workshop includes such separate departments as: truck and tractor repair equipment, electrician's shed, rigging and cable storage, shovel parts, a machine shop equipped with lathe, drill press and grinder, an assembly shop equipped with a large overhead crane, and a very complete welding shop.

The Atkinson Company has the following equipment on the job: two 50-B Bucyrus-Erie steam shovels, one 50-B Bucyrus-Erie Diesel-powered dragline with 2-yard bucket, one 43-B Bucyrus-Erie gas shovel with 1¾-yard dipper, one E-2 Bucyrus-Erie Diesel shovel, one 75 Thew-Lorain 1¼-yard gas shovel, one Northwest 1¼-yard gas shovel, six Model L Allis-Chalmers tractors with LeTourneau bulldozers, one LeTourneau scraper, one LeTourneau ripper, one LeTourneau tamper, five new AC6 Macks with 12-yard rock bodies built by Isaacson and equipped with Wood hoists, three Sterlings with 9-yard bodies, one Gardner-Denver portable compressor, and four Ingersoll-Rand air-compressors.

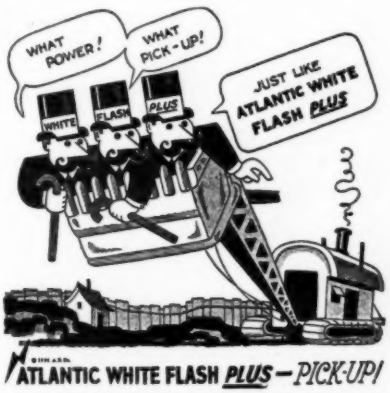
For the War Department, Major C. F. Williams is district engineer; Lt. J. S. Gorlinski, chief executive officer; Geo. E. Goodwin, resident engineer; and V. L. Glaze, associate engineer.

Bucyrus-Erie 50-B steam shovel excavating the canal locks, and loading into Mack trucks.

"I refused to marry Bob three months ago and he's been drinking ever since."

"That's what I call carrying a celebration too far." — *Sydney Bulletin.*

Shovel Symbolizes Power and Pick-up in Gasoline Ad.



THESE "Three Little Men" in the shovel scoop were pictured in a recent ad of the Atlantic Refining Company. We reproduce it here because the unique results of an artist's efforts when he draws a shovel are usually amusing to excavating men.

New Type Jetties Form Beach

By **T. C. DuMOND**

THE DUAL PROJECT of building a fine bathing beach and at the same time preventing soil erosion is now under way at Cudahy, Wisconsin. Cudahy is an industrial city located on the shores of Lake Michigan south of Milwaukee. The lake front here is bordered by a high bluff. The beach is narrow and strewn with rocks and coarse gravel. The shore line at this point has been receding at a rather alarming pace for many years. Heavy rains cause portions of the bank to wash down to the water, while the pounding action of large waves rolling in against the unprotected shore crumbles the bank from the bottom.

Several methods of overcoming this bank erosion have been tried in other cities along the lake, all proving moderately successful, but none was considered suitable for this location. After much study it was decided that a series of concrete jetties would prevent the carrying away of soil and in addition would cause sand to be deposited along the shore so that a bathing beach would be formed.

Unlike the usual jetty those used in this project are of open construction, allowing the water to flow through them. This insures an even distribution of sand on both sides of the jetty.

First jetty proves successful

The construction of the jetties was started during the summer of 1933. The first jetty completed has already caused more than forty feet of beach to be formed. Should the remainder of the jetties prove as effective a beach 3500 feet long will be formed within two or three years.

At the present time five jetties are in various stages of completion. Twelve in all are to be built. The foot of each jetty is started about ten feet out into the lake from the normal water line. From this point they extend out from 200 to 250 feet into the lake. To obtain maximum efficiency they are placed parallel to each other about 200 feet apart.

Interlocking concrete blocks used

The blocks used are made of pre-cast concrete, and are shaped so as to interlock. They are held in place by steel rods, about one-half inch in diameter, which run through them vertically. If the blocks were to be placed in such a way as to form a solid wall, the sand would be deposited on one side only while the beach would continue to erode on the other.

When the first jetty was started a man-powered hoist was set up for placing the blocks. However, it was soon found that more power was needed, and now a power crane is being used to place the blocks, each of which weighs nearly two and one-half tons.

In addition to building the jetties the erosion work required the digging of a network of drainage ditches, running the entire length of the bluff.

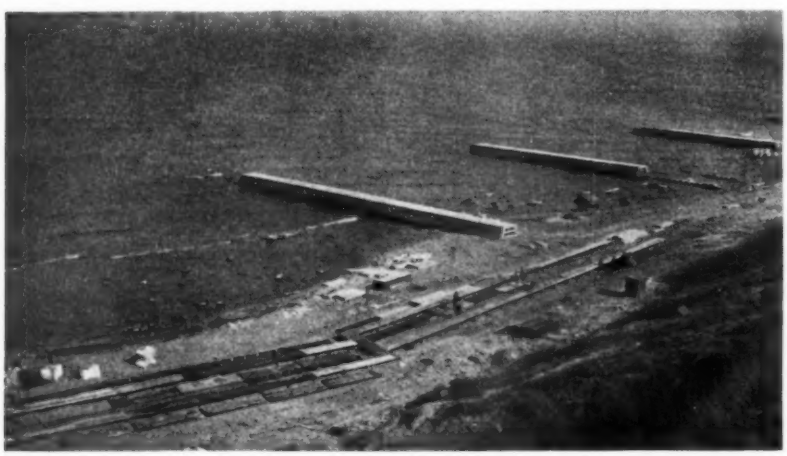
Material costs low

Due to the utilization of sand and gravel deposits at the work site, material costs have been kept quite low. All that has to be purchased is the lumber for forms, steel, and cement. About $30,000 has been spent on the project up to the end of May 1934.

The engineering work on the project is being handled by the Regional Planning Commission of Milwaukee County. The beach is being formed on county property, at the foot of Sheridan Park.

With the exception of eight or ten men, who serve as supervisors, all of the work on the project is being done by young men from a Civilian Conservation Corps Camp located near the site. Most of the boys are inexperienced when they reach the camp, but after thorough training they are able to handle the work in a capable manner. They work in six-hour shifts, about one hundred to a shift.

Due to the uncertainty as to the length of time that these camps are to be maintained, the project is scheduled to be finished at the end of this summer.



These open jetties act as barriers preventing erosion of the bluff and at the same time forming a fine sandy bathing beach.

Teacher (to Willie): "Spell 'straight'."

Willie: "S-t-r-a-i-g-h-t."

Teacher: "What does it mean?"

Willie: "Without ginger ale or water."

His Boss — Dodson, I found this long blonde hair on the back of my limousine. My wife's hair is black.

Chauffeur—I'll give you an explanation, sir.

Boss — Explanation, nothing. What I want is an introduction.

Establishing new records in tunnel driving, this crew with a 1¼-yard tunnel shovel mucks out a round in less than 2½ hours.

Whitewater Tunnels Dug Through Gravel

West Construction Company's section of the Colorado River Aqueduct progressing rapidly

By JOS. C. COYLE

VARIED PROBLEMS are being met and conquered by the Metropolitan Water District of Southern California and the thirteen contractors engaged in constructing the 91 miles of tunnel necessary to carry water 241 miles from the Colorado River to the Cajalco Reservoir in Southern California. Whether the tunnel goes through solid rock or gravel, wet digging or dry, engineers must, and do, find a way to cope with conditions present in each of the 29 separate tunnels involved. Because the exact nature of the earth at all points along the tunnel can not be fully predetermined, an ample margin for safety is allowed in planning each job. The work goes on with little delay from bad spots encountered.

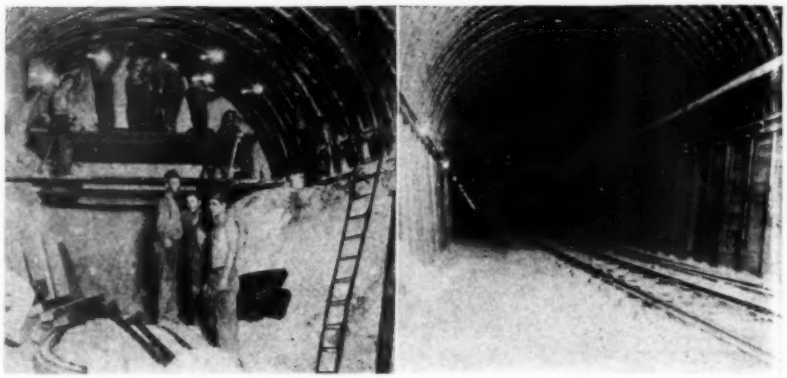
Whitewater tunnels No. 1 and No. 2, awarded to the West Construction Company of Los Angeles, at a bid price of $1,051,637, are both in compacted gravel. While the gravel must be blasted, it is not sufficiently stable to bear full-face driving. The two tunnels are separated by the boulder-strewn bed of the Whitewater River, ordinarily dry, but sometimes swollen with the run-off from hard rains in the San Bernardino mountains, which empties into the Salton Sea 30 miles away, about 200 feet below sea level. Both tunnels are being driven well above the danger point from such floods, and will be con-

nected later by a siphon 2,550 feet long, passing under the stream bed.

No. 2 tunnel going through first

Approach-cuts to both tunnels were excavated by H. W. McKinley, sub-contractor, with Caterpillar-mounted LeTourneau rooters and scrapers. No. 1 tunnel will be 2,060 feet long, through a flattened hill of gravel on the east side of the Whitewater River, with a comparatively shallow overburden. Only the 50-foot approach-cut to this tunnel has been excavated. No 1 will be driven after No. 2 is holed through, and while the latter is being concreted.

No. 2 tunnel is through higher gravel foothills west of the river and will be 8,146 feet long and have an inside radius of 16 feet when concreted. The concrete lining will be horseshoe shaped, with a minimum thickness of 9 inches on sides and top, and 6 inches on the bottom. Over-all radius of the tunnel excavation is about 19 feet. Going underground in September, 1933, the contractors have made excellent progress, despite the fact that every foot of the tunnel must be supported by steel liner plates. The practically all-steel construction is used to minimize the fire hazard. 953 feet were driven in 27 working days from May 15th to June 15th, establishing a record for tunnel-driving for the entire aqueduct. By June 22, the tunnel was in 6,250 feet.



At the left the men are placing liner-plates. At the right the tunnel is ready for concreting.

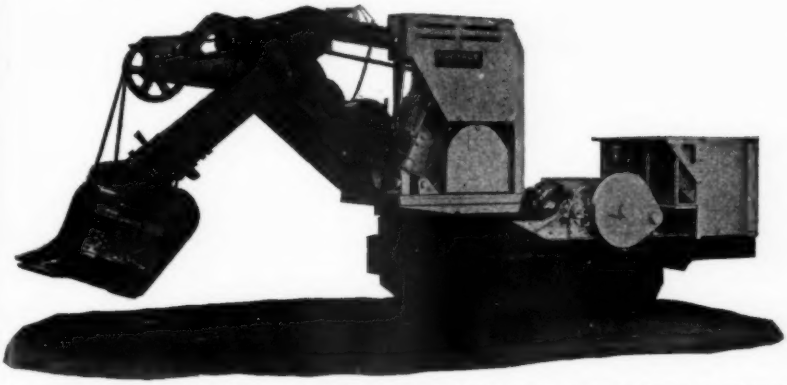
Above is shown a view of the dump, while below is the portal to No. 2 tunnel.

Unstable gravel presents difficulties

Owing to the unstable nature of the gravel, the contractor makes use of a particular method of driving by which he gains faster progress and greater safety. The middle and upper portions of the heading are carried forward together, leaving a bench of the compacted gravel undisturbed for a distance of ten to fifteen feet back from the face, on each side of the tunnel. These benches are three feet or more wide and about eight feet high, reaching to the spring line of the tunnel. They are used to support the forward ends of the wall plates until posts can be set in, as the arch of the liner plates must be kept close to the face to protect workmen from possible injury by falling rocks.

Scaffolding, laid across the benches near the face, is used while placing liner plates or the crown-bars, sometimes used in the softer going, ahead of the liners. Working on this scaffold places the men up near the roof and lessens the force of any small rocks that may crumble off and hit them while timbering. The drilling of the upper part of the face is also done from this scaf-

The drilling crew works on the scaffolding which is laid on top the benches left especially for this purpose.

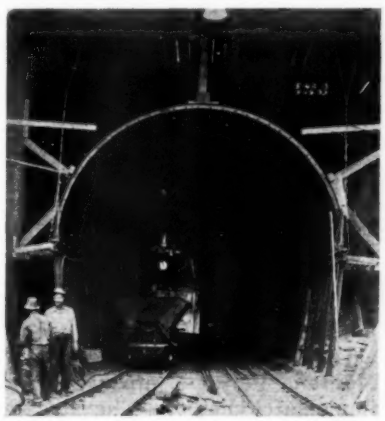


A compact, full revolving, electrically operated 1¼-yard tunnel shovel, designed especially for close-quarter operations, does the mucking in the blasted gravel.

fold. The cut between the benches provides easy access to the platform in bringing up or removing steel, etc. When the rear ends of the benches are removed, jacks are used under the wall-plates while posts are being set.

Light blasts used to loosen gravel

Ingersoll-Rand jackhammers, with wet heads, and crucible steel spade-bits, are used in drilling. Water must be used sparingly so that the drill holes do not crumble. The holes are drilled to a depth of 10 to 12 feet ordinarily. They are shortened up when the ground becomes treacherous. About 22 holes constitute a round and are fired electrically off the firing line. Usually 250 pounds of 40% Apache stick-dynamite are used to a round, tamped in with sand cartridges. When it is necessary to blast the side-wall benches, one shot is usually placed in each, and these are fired at the same time the middle and upper part of the heading is blasted, keeping them always about the same distance behind. Often, however, these two holes are omitted.



This photograph was taken shortly after going underground in September 1933. Since then the West Construction Company has set records for tunnel driving. In 27 days the tunnel was advanced 953 feet.

A Bucyrus-Erie tunnel shovel used for mucking

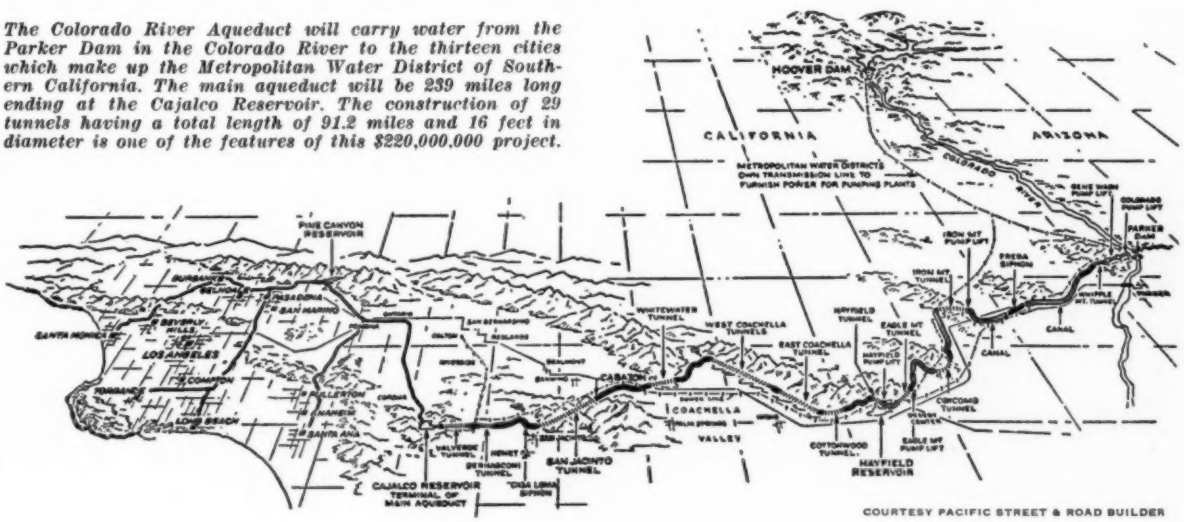
Due to the unusual system of keeping empty cars under the shovel, the time required for mucking out a round is less than two and a half hours. The West Construction Company uses a Bucyrus-Erie caterpillar-mounted electric tunnel shovel carrying a 1¼-yard dipper. This shovel looks something like a cross between a railroad crane and the conventional type of full-revolving shovel and has been developed particularly for tunnel work. The rear of the shovel carries an electrically operated hoist not shown in the illustration above. This is called a "cherry picker" and is used to pick up the empty car from the spur-track behind the shovel and swing it over on to the main track where the shovel runner can load into it. After filling this car, it is either pushed back by a shove from the shovel dipper, or pulled out by the locomotive. The track is then clear for another empty from the "cherry picker." Ordinarily it takes approximately 15 seconds to make the change-over, according to West Construction Company officials.

Electric haulage system used

Two Goodman 9-ton battery locomotives are used to haul the thirty 4-yard Koppel side dump-cars to the dump. This is located

(Continued on Page 344)

The Colorado River Aqueduct will carry water from the Parker Dam in the Colorado River to the thirteen cities which make up the Metropolitan Water District of Southern California. The main aqueduct will be 239 miles long ending at the Cajalco Reservoir. The construction of 29 tunnels having a total length of 91.2 miles and 16 feet in diameter is one of the features of this $220,000,000 project.



COURTESY PACIFIC STREET & ROAD BUILDER

Winston Brothers Develop Montana Placer Property

Mining gold with 3-yard dragline. The placer deposit lies in the foothills of the Rocky Mountains in Montana.

FOR THE PAST several months Winston Brothers Company, nationally known contracting company of Minneapolis, has been engaged in the recovery of placer gold in Prickly Pear Creek, near East Helena, Montana. On this property the placer deposit, averaging 20 feet in thickness, rests upon bed rock, and consists principally of sand and gravel, the gravel varying in size from ¼ inch up to 20 inches in diameter. The top six or seven feet of overburden is stripped off and wasted as it does not contain anything of value.

Recovery plant mounted on barge

The sand and gravel is excavated down to bed rock (from 15 to 20 feet under water) by a Bucyrus-Monighan 3-T walking dragline and loaded into the hopper of an Empire stacker scow. This is a gravel-screening device which separates, by means of a rotary screen, the coarse gravel from the gold and the black sand. The gold is recovered by a series of riffles which are located in the gold-saving sluices on each side of the screen. The coarse gravel is conveyed from the lower end of the screen to the tailings pile by means of a belt conveyor. The Empire stacker scow floats in a pond immediately behind the dragline.

The dragline is driven by a Fairbanks-Morse Diesel engine. The pumps, screen, and stacker on the scow are motor driven, power for the motors being secured from a power line of the Montana Power Company in the immediate vicinity. The stacker scow draws about 3500 gallons of water per minute from Prickly Pear Creek which carries water the year round. The pumps supply water to the hopper and to the revolving screen where the gravel is thoroughly washed. The water carries the screenings down over the riffles which catch the gold while the fine gravel and sand continue on and are discharged back into the pond at the rear end of the screen.

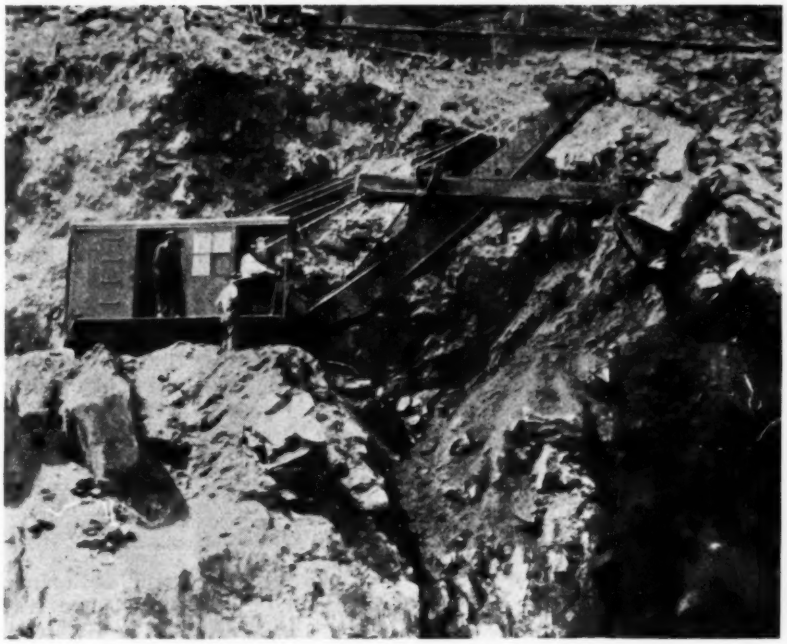
5-day a week continuous operation

This operation is carried on 24 hours per day, five days per week. All hours of labor and wage scales are in compliance with the NRA. The operation requires two men on the dragline, four men on the stacker scow and one foreman per shift, as well as a superintendent and a clerk. About 1500 cubic yards of material are run through the stacker scow each 24 hours.

The delays occasioned by breakdowns in the excavating or the

(Continued on Page 322)

The left view shows the equipment in action. 1500 yards of gold-bearing sand and gravel are dug by the dragline and passed through the screen every 2½ hours. The right shows the interior of the Empire stacker scow with its rotary screen and the riffles which catch the gold.



This Bucyrus-Erie 43-B shovel working on the edge of a 35-foot face is stripping overburden and sloping bank at the building site of a ventilation shaft for the new Midtown Tunnel.

Starting the Midtown Hudson Tunnel

George M. Brewster & Son, Inc., handles difficult excavating job in the Palisades

By **W. W. BLAUVELT**
Chief Engineer, Geo. M. Brewster & Son, Inc.

AN ADDITION to the famous tunnels passing under the Hudson River between New York City and the neighboring cities of New Jersey, will be the Midtown Hudson Tunnel, which will connect 38th Street in the Borough of Manhattan, with Weehawken, N. J.

The construction of this tunnel was recently awarded to Mason & Hanger Company, Incorporated, New York City, on their bid of $6,452,300 by the Port of New York Authority, the governing body on interstate transportation by tunnel, bridge, and ferry between the states of New York and New Jersey and the different boroughs of New York City. One item of the contract calls for the building of a ventilation building and shaft at Weehawken. Mason & Hanger, Inc., sublet the excavation for this building to George M. Brewster & Son, Inc., Bogota, New Jersey, a contracting firm noted for its ability in successfully completing difficult excavating jobs on time.

33,000 yards of rock taken out of the Palisades

The Weehawken ventilation building site, 226 feet by 75 feet, is located just west of the New Jersey Junction R. R. tracks, in a side hill of the Palisades, at a point known locally as "King's Bluff." On this plot of ground the excavation varies from 0 feet adjacent to the railroad tracks, to 83 feet on the westerly side. Approximately 33,000 yards of rock will have to be moved.

George M. Brewster & Son, Inc., is using three shovels on this job, one Bucyrus-Erie 43-B, one 37-B of the same make, and one P&H 700.

After excavation had progressed to the point where the shovels were working against a 35-foot face, it was found that the earth overburden, now 25 feet through, and containing many large boulders, was too deep for satisfactory down-hole shooting. It was decided to strip with a shovel, but the next question was how to get the shovel to the top of the 35-foot face. Finally, by means of an extremely steep earth and rock ramp, and the use of jacks, the 43-B shovel made the grade. After stripping off the required amount of overburden and dumping it back into the cut, the shovel worked its way back down the ramp again.

The use of dynamite restricted

The earth and rock are loaded by the shovels into 20-yard railroad dump cars; the railroad company, in turn, hauling the material away for use in filling in along their right-of-way. The contractor uses a Northwest crane handling a 2-ton ball for cracking up large rocks and boulders as the use of dynamite here is very greatly restricted. This method of breaking up rock has proved very efficient.

The drills on this job are supplied with air from a battery of portable air-compressors located on the east side of the railroad tracks. A four-inch air-line passes

The overburden is dumped back into the pit where it is loaded into railroad cars.

under the tracks and up the hill on the south side of the cut, then along the west side with take-offs at regular intervals from which air is supplied to the drills by the manifold method.

Job will be finished on time

The work, while presenting many problems that had to be solved as they were encountered, has progressed steadily, and will be completed within the time set by the general contractor.

The personnel of the George M. Brewster & Son organization on this project consists of Paul Burkhardt, superintendent, who has had many years of experience in rock excavation; Eugene Chapman, resident engineer, together with a good-sized crew of experienced workmen. In addition, William J. Brewster, president of the firm, because of his interest in the work, spends considerable time on the job.

Joan: "I am going to do my bit, dad. I'm getting a dressmaker to teach me how to cut out dresses."

Dad: "I don't want you to go so far as that. But I think you might cut out cigarettes and $10 hats."

Winston Brothers Develop Placer

(Continued from Page 320)

screening and washing equipment have not been serious. Aside from a ten-day shutdown during the past winter for general repairs, no time was lost on account of cold weather.

In this location the company has sufficient placer ground ahead to enable it to operate for several years.

Porter: "Miss, your train is—"

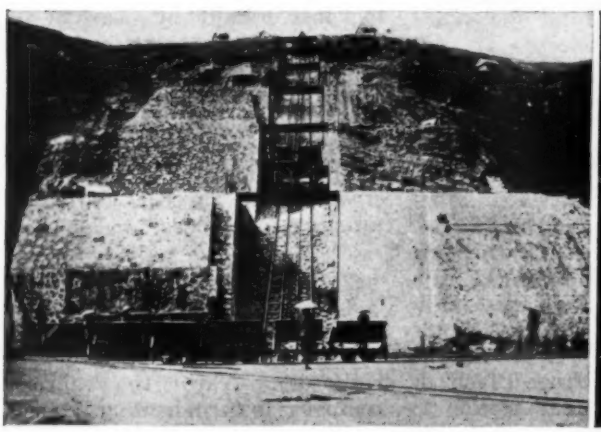
Precise Passenger: "My man, why do you say 'your train,' when you know it belongs to the railroad company?"

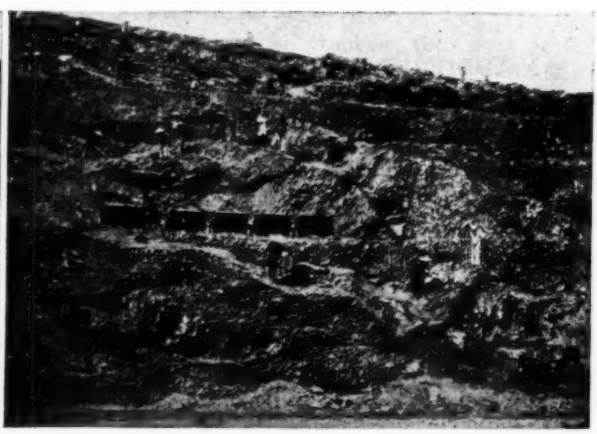
Porter: "Dunno, Miss. Why do you say, my man,' when you know I belong to my old woman?"

He: "Don't you think Gladys shows distinction in her clothes?"

She: "Well, I'm not sure I'd use the word 'distinction.' Don't you mean distinctly?" — *Mr. Whoops.*

Ancient Ways in Modern Days





HERE IS THE WAY they still mine coal in Indo-China. These pictures show the coolies with their "thatched" hats mining by the good old pick and shovel methods. They use long handled shovels and picks. The "dinkey-skinner" bobs his baggy "pajamas" and "smokes" the one-car trains down the track after getting a "kick-off" from the "car-spotter."

The incline that takes the coal out of the pit is quite a modern affair by the looks of it, though our correspondent doesn't tell us anything about the type of power used or the speed at which the cars are raised.

But how we'd like to put a couple of small shots in to shake up that nice coal bank a bit and then turn a modern power shovel into it. They could keep all the present "shovel-runners" busy running the buggies . . . and how they'd have to run! Locomotives and larger cars would follow.

Perhaps the increased output would involve finding increased markets but lower production costs would make coal cheaper, and more people could enjoy the benefits of this convenient form of fuel. Lower mine costs would increase the marketing area and would also encourage development of new industries by lower power costs. So modernization would work out to the benefit of all concerned as it has throughout the history of civilization.

Old Times & Old Timers

Some Real Thrillers With Old Timer Bixler

SOME interesting pictures and thrilling experiences have been sent us by W. W. Bixler of Amboy, Illinois, who says he may not be as old as some, but he can remember twenty years back, and the excavating game has gone a long way since then. He writes:

"I want to call your attention to this Monighan picture (top) of the year 1913. This was a skid and roller, cable swing machine. It had a link reverse, swinging engine operated (or reversed) by a steam ram. With a split, swinging drum, one had to be careful in reversing the machine when swinging, or it was 'Good-bye swinging cable.'

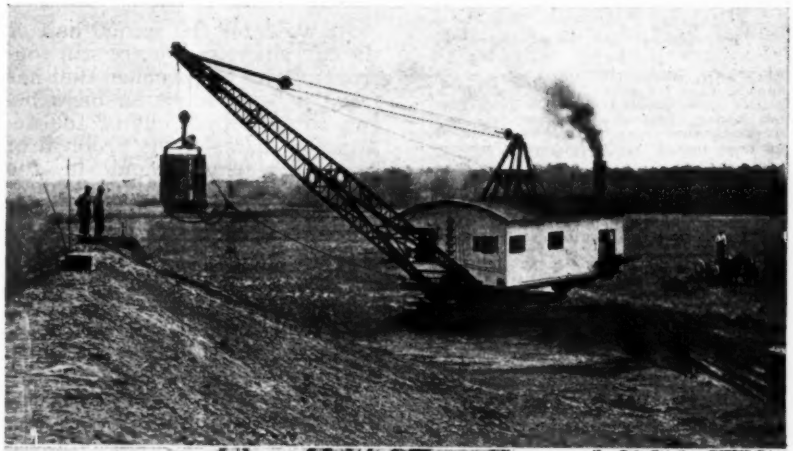
"Another picture (left center) shows the same machine tracking across soft marshy ground in the Mississippi River bottom in 1914. Note the number of men required, and also the stiff bail on the dragline bucket.

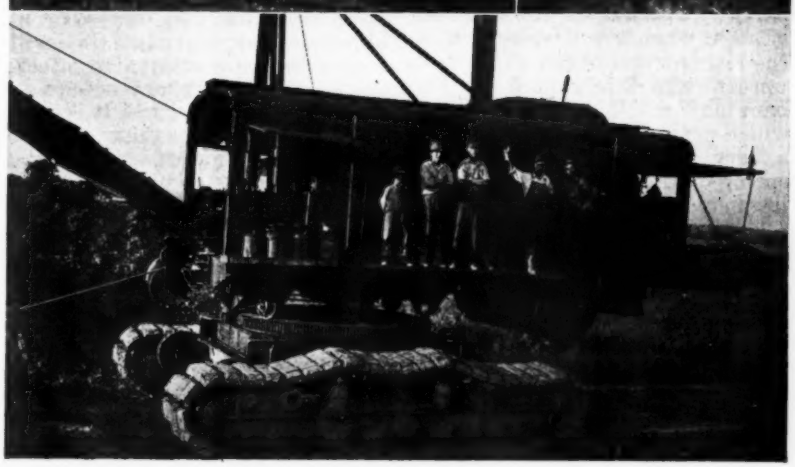
"I started firing this machine in 1913. Fired nearly three years. In that time I fired for 24 different operators. Good dragline operators were as scarce as hen teeth. Among some I remember were Fred Chapman, P. E. Pierson, T. M. Brooks, Pat McKay, R. V. West.

"Another view (bottom) is of the Class 9½ Bucyrus which came out, I think, about 1913. I operated one of these machines for three years afterward. I happened on to this model at Pontiac, Michigan in 1929, still going strong.

"I have had a number of thrilling experiences, but I think one of the most outstanding was getting caught in a wind storm while towing a big dredge to Keokuk dry docks on the Mississippi. When the smoke cleared away, I was stranded in a tree some quarter of a mile from the tow, surrounded by water. It took quite some time before I could be rescued, on account of the wind.

"Another thrill was getting caught in an ice gorge with cabin boats in the Mississippi. When that was over, one of the cabins was in the bottom of the river.





The other two were stranded high out of the water on top of the ice gorge. We dynamited ice for three days to get them to the shore."

The right center picture shows an old time shop photographed in 1913. In those days horseshoeing was a major part of the blacksmith's job.

Thank you for the pictures and the thrillers, Old Timer Bixler. Our old timers will find them interesting.

Old Timer Webster Oiled the Fairbanks Back-Digger

OLD TIMER Ernest Webster is one of our many readers who have responded to questions asked. He writes from first-hand knowledge of George Castle's Fairbanks back-digger:

"I notice you would like to hear from anyone that worked on a Fairbanks back digger with a two line control that George Castle owned at Crookston, Minnesota.

(Continued on page 325)

EXCAVATING ENGINEER FOUNDED 1906

A Monthly Publication Devoted to Excavating and Allied Subjects

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The Business Situation

RECOVERY of business is being made by a series of advances, interrupted by shorter and less severe recessions, just as the slowing up of business to the depths of depression took place by a series of severe recessions interrupted by temporary improvements in business. The real bottom of the depression was apparently reached in the summer of 1932 when the first upturn of the rising trend began. This first upturn was interrupted by the banking and credit situation which presented the country with a very serious problem. In the spring of 1933 the second advance began which, like the first, continued for about four months. The third forward movement began last December and has now been checked by a temporary recession which is partly seasonal.

As we enter the second half of the current year, we are still confronted with the problem that has faced us ever since business began to pull itself out of the depression, namely, the problem of increasing employment in the *durable goods industries*. One of the most striking difficulties of the present depression has been the great unemployment in the durable goods industries and a corresponding unemployment in the service industries, the direct result of the lack of activity in the durable goods industries. Until we get greater activity in the durable goods industries, we cannot expect normal business activity and normal employment.

In past depressions, construction has usually been an important factor in improving business. There has been considerable discussion in recent months as to whether or not we are over-built as far as domestic housing is concerned. This question may be of major importance and it will be very interesting to see the final reports of the Government's Real Property Inventory. It is probable, however, that some time will elapse before we learn to effectively use the data now being collected for the first time. It is very interesting to note that many of the preliminary reports of the present property survey indicate a very definite need of housing facilities in widely spread parts of the country. Furthermore, the type of need is such that returning good times should quickly develop demand for many, though probably moderately-priced, dwellings.

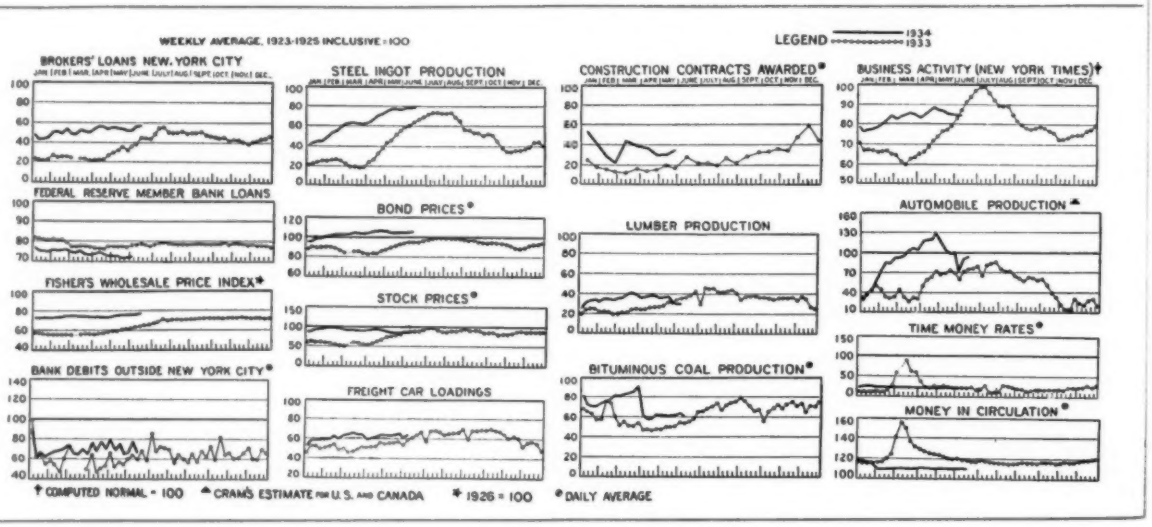
Of equal, if not greater, importance to recovery is the speed with which other private ventures are begun. We must do everything possible to hasten construction of all kinds and the promotion of all private enterprise which will call for the production of durable or consumer goods.

Contracts let for all classes of construction during May in the 37 Eastern States were 2 per cent larger in dollar volume than the April total, according to F. W. Dodge Corporation. At the same time the contract total of $134,445,700 was substantially above the contract total of $77,171,700 reported for May, 1933.

Privately financed contracts amounted to $62,846,500, which is the largest private contract total since June of last year. It was 12 per cent over April and 17 per cent over May of last year. It should be noted that the May increase in privately financed contracts was entirely due to the inclusion of one large new building project in connection with the development of Rockefeller Center, New York. During nine of the past 12 months, private work has exceeded the amount for the corresponding month a year previous.

Publicly financed contracts, i. e., construction jobs undertak-

WEEKLY BUSINESS INDICATORS


WEEKLY AVERAGE, 1923-1925 INCLUSIVE = 100
LEGEND 1934 1933
BROKERS' LOANS NEW YORK CITY
STEEL INGOT PRODUCTION
CONSTRUCTION CONTRACTS AWARDED*
BUSINESS ACTIVITY (NEW YORK TIMES)†
FEDERAL RESERVE MEMBER BANK LOANS
BOND PRICES*
LUMBER PRODUCTION
AUTOMOBILE PRODUCTION▲
FISHER'S WHOLESALE PRICE INDEX*
STOCK PRICES*
TIME MONEY RATES*
BANK DEBITS OUTSIDE NEW YORK CITY*
FREIGHT CAR LOADINGS
BITUMINOUS COAL PRODUCTION*
MONEY IN CIRCULATION*
† COMPUTED NORMAL = 100 ▲ CRAM'S ESTIMATE FOR U.S. AND CANADA * 1926 = 100 * DAILY AVERAGE

en chiefly with PWA funds, totaled $71,599,200 for May. This was smaller by 8 per cent than the total recorded for public contracts in April. With the exception of February of this year, the current total was the smallest monthly volume for this class of work reported since August, 1933. At the same time the May total for publicly financed contracts was three times as large as that shown for May, 1933, before the advent of the current PWA program.

May contracts for residential building alone totaled $24,847,200 as against $22,685,700 for April and $26,519,700 for May, 1933.

For the elapsed months of 1934 construction awards of all descriptions in the 37 Eastern States totaled $727,301,000, as contrasted with $329,771,500 for the corresponding five months of 1933. Gains over 1933 for the current year to date were shown in each of the four major construction classifications: for residential building, about 20 million dollars; for non-residential building, about 100 millions; for public works, almost 245 millions; and for public utilities more than 30 millions.

Contemplated construction reported during May for the 37 states east of the Rocky Mountains totaled $241,271,200 as against $319,721,600 for April and $352,467,700 for May of last year.

Patrick L. Connolly

PATRICK L. CONNOLLY, 47, proprietor and director of the Connolly Contracting Company, St. Paul, Minnesota, died suddenly Saturday afternoon, June 16, following a heart attack while playing golf at Midland Hills Country Club, St. Paul. Mr. Connolly organized the Connolly Contracting Company 15 years ago, directing its affairs until his death. He was well known in excavating, grading, and trucking circles, having carried to completion many large engineering projects. Among his many contracts were the excavation for the St. Paul Court House, First National Bank Building, St. Paul, and Sears Roebuck Company, Minneapolis. At present the company is engaged in a large trucking contract with the Mason-Walsh Company of Glasgow on the Fort Peck Dam project in Montana. Mr. Connolly is survived by his wife and three sons, Patrick, Jr., Joseph, and Bartholomew.

Building Croton Dam in 1896

THE frontispiece illustration was taken from the October 17, 1896, issue of the Scientific American. It is interesting to compare excavating methods and equipment in use then, 38 years ago, with those of today. From the Scientific American we quote:

"At a point on the Croton River, about three and a half miles below the location of the present dam, work is now in progress on the erection of what is known as the New Croton Dam, on the Cornell site. Our illustration shows the present aspect of the work as now in progress. This dam is the outcome of the proposed Quaker Bridge Dam, and will be one of the largest dams ever erected by man.

"The principal portion extends directly across the stream, its southern section being of earthwork and the higher portion to the north being in masonry. The earthwork dam contains the usual rubble masonry core, with a 6-foot crest, which crest is 5 feet above the water level, though still below the summit of the earthwork. The masonry dam varies in width at the bottom according to its height, with a maximum height of 238 feet and a maximum width of 185 feet. It is established on a level bed prepared in the natural rock, with two ditches or cuts running its length to give it a better bite upon the rock, the masonry work being carried down into these cuts.

"The spillway is quite peculiar in arrangement and forms one of the characteristic features of the dam. Starting at the bottom of the northern end of the dam, it rises in a series of steps parallel with the axis of the dam, by which about two-thirds of its height is reached. Here a platform or level area is established, and from it the remaining steps of the spillway rise, their faces being nearly at right angles in direction to the main axis of the dam. The top of the spillway is 24 feet below the level of the water. The gap formed by the spillway is to be crossed by a bridge. The dam is to be 1,200 feet long and the spillway will provide a crest of 1,000 feet in length for water to escape over.

"Across the dam and bridge, a private department road will be carried, 20 feet wide, leaving a margin of 5 feet on each side for necessary railing and coping. The new dam will increase the area of Croton Lake to 7,500 acres, with a capacity of 30,000,000,000 gallons, submerging the present Croton Dam and back of it Muscoot Dam, in what may be designated the upper levels of the water supply. As one of the objects of Muscoot Dam, which impounds 6,000,000,000 gallons, is to maintain an even level of water to meet the desires of the inhabitants of the neighboring country, the net or available contents of the dam may be taken as 24,000,000,000 gallons, or over two months' supply of water for the city of New York."

Old Times & Old Timers

(Continued from page 323)

I was raised at Crookston, and worked as oiler on that machine at Dugdale, Minnesota, 24 or 25 years ago. We put in a big state ditch a few miles out of Dugdale.

"The runner's first name was Ray; I don't remember his last name, but I believe he was from Indiana. It was a four Caterpillar machine and was powered with a single Fairbanks-Morse engine that we used to start with a match and air that we pumped up by hand. We ran two shifts and used to move a lot of dirt. The machine weighed around 90 or 100 tons, but it was a regular duck in the mud. It was held rigid by two cross cables underneath the platform, which used to pull out of the eye socket about once a week and it was surely a nice job to put back in place.

"If Ray should see this letter, he will remember me by this yarn. On the 4th of July George Castle wanted to work, so he told us if we would work he would buy each shift a keg of beer, so I bought some limburger cheese to make the day right. The whole crew was eating dinner when George Castle came in. I noticed he didn't eat any of our limburger and I asked him if he ever ate any. He looked around and said, 'No, by gawd, but I have stepped on it.'

"I am operating a small dragline for the Moran Construction Company, Omaha, now, and would like to hear from some of the boys that were on that machine with me."

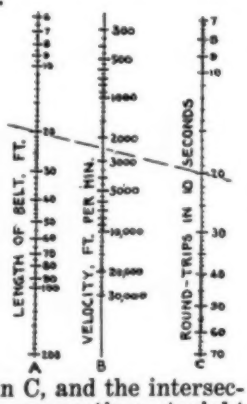
We hope you do hear from them, Old Timer Webster. We were glad to hear from you. Thanks a lot.

FIELD NOTES

Finding the Velocity of a Belt Without a Speed Indicator

IT IS EASY to determine the velocity of most belts without the use of a speed indicator by applying the following simple kink: Make a chalk mark, or any other kind of mark that will be visible, on the outside of the belt. This can usually be done while the belt is moving at full speed. Then estimate the length of the belt in feet. If you want greater accuracy, measure the length of the belt, or, compute the length in accordance with the many formulas on belt length that are to be found in almost any engineering handbook or belt catalog.

If the belt is 20 feet long you now know that every time the chalk mark makes a "round trip" the belt travels 20 feet. Next take out your watch and count the number of round trips in 10 seconds. Then apply this chart. In an instant the chart will give you the velocity of the belt in feet per minute.



For example, if the belt is 20 feet long, and if it makes 20 round trips in 10 seconds, connect the 20 in column A with the 20 in column C, and the intersection of the connecting straight line with column B gives the answer as 2400 feet per minute. See the dotted line drawn across this chart.

To count rapidly, where belts are short and speeds high, use the fingers of one hand and count only to ten, counting over and over. Use the fingers for keeping tab on the number of tens. One can count to ten more quickly than from ten to twenty, or from twenty to thirty. Try it and be convinced. Thus to count to thirty with utmost speed, simply count to ten three times in succession. The reason for this is that all of the numbers from one to ten are words of one syllable—all excepting "seven" which can be shortened to "sev" for the sake of speed.

Inversely, this chart can be used for determining the length of a belt. Thus if you have a speed counter, take the r.p.m. of the pulley in the usual way and compute the velocity of the belt in feet per minute. Then count the round trips of the belt in 10 seconds. A straight line through the known points in columns B and C will give the belt length in column A. But, of course, don't depend on the result as being absolutely accurate. For absolute accuracy, measure the belt length with a steel tape.

W. F. Schaphorst, M.E.

Characteristics of Explosives

DESCRIPTIONS of the physical characteristics of the various explosives are given by experts of *E. I. du Pont de Nemours & Company* as follows:

Gelatin 20-75%—very water resistant—very quick when confined; rather slow unconfined. Heavy — dense — greatest effective power per volume.

Straight Dynamite: 20-60% (but not often used in lower than 40% strength). Good water resistance—not so good as Gelatin. Quickest of commercial explosives. Also the most sensitive. Best adapted for mud-capping and ditch blasting by the propagation method.

Ammonia Dynamites or Extra Dynamite: (20-60%) Slower in action than the straight dynamite, less sensitive. Better heaving action in soft material like earth, clay, shale, sandstone. Most popular all-around high explosives used at the present time.

Low Density Ammonia Powders: (Sometimes called High Count) Somewhat similar to Ammonia Dynamites in physical characteristics, but they do not stand water as well. Very economical in some kinds of work.

Free Running Powders: Made in four strengths. Excellent for loading in sprung holes, provided the holes are dry. Water resistance very poor. Excellent for soft materials, and where small sized drills only are available, and where holes are sprung.

Black Blasting Powder: Most economical of all explosives where it can be used. Has greater heaving action than high explosives, but must be loaded only in absolutely dry work. In large charges best fired with a primer of straight dynamite.

Luminous Center Line Markers

AS PART of its state-wide program to make highways safer for motorists, the Ohio State Highway Department is installing luminous center-line markers at dangerous and hazardous points on the state highway system.

The luminous device consists of a metal marker adapted for easy insertion in the center-line road surface. The marker contains a reflector button "cat's eye" in each end facing approaching traffic coming in opposite directions. The "cat's eye" vividly shows up the center of the road to the motorist driving at night or when visibility is poor because of fog or storm.

Watch Water Circulation

A CONTRACTOR was having trouble breaking cylinder heads on his gasoline engine. He had broken about three heads and was unable to locate the cause. He finally called a service man and upon examination of the water pump it was found that the pin and key through the impeller and water pump shaft was broken letting the shaft turn in the impeller, and, therefore, not giving the engine enough circulation.

How Much is "More or Less"?

WHEN ONE speaks of excavating to certain dimensions, "more or less," it makes considerable difference whether it is a tooth or a tunnel that is to be drilled. That "more or less" is an elastic term is shown by a decision rendered by the Michigan Supreme Court (165 N. W. 618).

A contract involved in that case called for construction of a tunnel through a hill, "approximately 1,200 feet in length, more or less." The location was shown by plans and profiles, and the work was to be paid for by the linear foot.

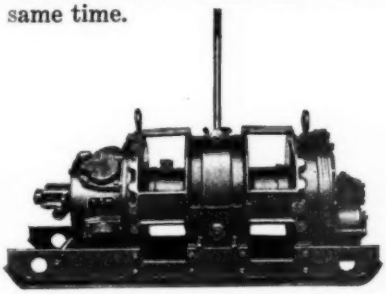
(Continued on page 348)

EQUIPMENT
You Ought to Know About

Utility Air Hoists

INGERSOLL-RAND Company have issued a new bulletin describing their utility air hoists. This air hoist, single-drum type, can be used for such work as hoisting materials, moving timbers, spotting cars, etc., while the double-drum type can be used for slushing out material in mining work, loading cars, and dragline excavating.

The double-drum air hoist has the "Joy Stick" control, a single lever by means of which the operator has complete control of the hoist. This single lever controls throttle valve and clutches at the same time.



The single-drum hoist is available in ten sizes, up to 2000 pounds straight-line pull. The double-drum type is available in four sizes up to 2000 pounds capacity. For complete information regarding these hoists write the Ingersoll-Rand Company, 11 Broadway, New York City.

A Grading Bulldozer

A BULLDOZER you can grade with is the way the Continental-Wooldridge Heavy-Duty Bulldozer is described. The bulldozer blade can be tilted—either end up—so that dirt or other material that is being moved can be graded at the same time. This new feature, exclusive on Continental-Wooldridge, should prove useful to contractors on road work, levee building and similar jobs. The blade is powered both up and down—or can be held in any position, whether a straight blade or tilted. This is controlled by a large capacity, hydraulic pump operated direct from the tractor take-off. Detailed information can be obtained direct from the Industrial Equipment Division, Continental Roll & Steel Foundry Company, 332 South Michigan Avenue, Chicago, Illinois.

Penstock Pipe at Boulder Dam to Be Moved on Giant Trailer

AFTER THE completion of a severe test at Boulder City, a giant trailer for carrying the great penstock pipe from the fabricating plant to Boulder Dam has been pronounced satisfactory by government and Six Companies, Inc., engineers.

The trailer, sold by the C. R. Jahn Company of Chicago and built by the La Crosse Boiler Company of La Crosse, Wisconsin, is the largest ever built. It is 37 ft. 8 inches long and 22 ft. wide. The frame is of fabricated steel built up on two 33-inch beams. It is mounted on 16 wheels supported by eight axles. Each axle carries two wheels with two tires to the wheel, making 32, 28x14 tires. Axles are of the tilting, oscillating type to care for road irregularities and assure a level platform and balanced load. All 16 wheels are steered by hydraulic pressure.

Air brakes, operating on pressures up to 200 pounds, assure complete control of the trailer and its load. Safety features provide for the application of the brakes should the hauling unit be disconnected.

The test of this huge unit was held near Boulder City and was attended by the engineers of the United States Government, the engineers of Six Companies, Inc., and the manufacturers. The test consisted of loading the trailer with bundles of reenforcing rods averaging two hundred 5/8-in. rods to the bundle. The load was 194 tons not counting the timbers used in piling the steel. The trailer weighs 41 tons, making the gross load almost 235 tons.

The trailer and its load was then pulled over a round-about road to the highway. This necessitated crossing tracks and rough terrain, a feat that amply demonstrated the flexibility and strength of the machine and prompted its unqualified acceptance by the engineers.

The delivery of the pipe to the dam has been one of the major problems confronting the government and the Six Companies' engineers. Some of this pipe is the largest ever built, weighs 185 tons, and is 30 ft. in diameter—almost four stories high. It is 2¾ in. thick and made of six plates of steel, so heavy that only three plates make up a load for one flat car from the steel mill to the fabricating plant. The trailer and this great load must travel over a road 1½ miles long, blasted out of the mountain side, to the dam site where it will be unloaded by the permanent government cableway and lowered to the penstocks hundreds of feet below.

Please mention *Excavating Engineer* when writing for information on new equipment.

Handy Fire Extinguisher

A UNIQUE NEW TYPE of fire extinguisher manufactured by the *Wil-X Manufacturing Corporation*, 29 Ryerson Street, Brooklyn, overcomes the disadvantages of the old style hand-operated extinguishers.

The new "machine-gun" extinguisher has the pump on the outside of the cylindrical container where it cannot gum up, jam, or corrode. The pump never comes in contact with the liquid, only compressing air which forces the liquid out under high pressure. A quick lift of the pump, and the new Wilbur supplies a steady stream of Wil-X liquid directly at the base of the flames.

SHOTS *from the Firing Line*

Cartwright Bill Signed by the President

A TOTAL OF $772,000,000 may be expended for road construction during the next three fiscal years under the terms of the Hayden-Cartwright bill just recently signed by the President. Add to this approximately $230,000,000 unspent funds which will be carried over from the present emergency road construction appropriation and the total amount available goes well over the one billion dollar mark.

The magnitude of the potential road construction program may be better visualized if the totals are itemized as they are to be spread over the three-year period.

July 1, 1934 to June 30, 1935:		
Outright grant to States	$200,000,000	
Forest, National Park, Indian Reservation, and Public Land roads	24,000,000	
Total		$224,000,000
July 1, 1935 to June 30, 1936:		
Federal Aid	125,000,000	
State Funds to match Federal Aid	125,000,000	
Forest, National Park, Indian Reservation, and Public Land roads	24,000,000	
Total		$274,000,000
July 1, 1936 to June 30, 1937:		
Federal Aid	125,000,000	
State Funds to match Federal Aid	125,000,000	
Forest, National Park, Indian Reservation, and Public Land roads	24,000,000	
Total		$274,000,000
N.I.R.A. Funds obligated but not spent (approximately)		$230,000,000
Grand Total		$1,002,000,000

Money made available to the states for road construction need not be entirely used up or obligated during the first year that the bill makes it available. There is one year of grace. In other words the $200,000,000 is available up to June 30, 1936 although it is called the 1935 appropriation; the $125,000,000 of the 1936 Federal Aid may be applied for any time between July 1, 1935 and June 30, 1937; and the 1937 Federal Aid appropriation is available up to June 30, 1938. This differs from the Federal Highway Act of 1921 in that the Federal Highway Act gave two years' grace instead of one, or a total application period of three years instead of two. By cutting the period of availability of funds under each year's items to two years, the Hayden-Cartwright bill should accelerate the letting of contracts in order to avoid the possible loss of funds.

A provision in the bill states that at least 25 percent of the amount expended by a state under this act shall be for secondary or feeder roads. Previous funds administered under the N.I.R.A. limited money for secondary or feeder roads to not more than 25 percent. Some State Road systems have been so planned in the past as to make it impracticable to spend as much as 25 percent on this type and in order to give some flexibility and provide for a proper balance in the road system, an amendment was agreed to by the House and Senate under which the "Secretary of Agriculture upon request and satisfactory showing from the highway department of any State may fix a less percentage of the apportionment of such State for expenditure on secondary or feeder roads."

Diversion of motor and gasoline taxes is discouraged through an amendment which reads in part as follows:

> "Prevents . . . . the diversion of motor taxes and gasoline taxes from highway maintenance, construction, and improvement, including the retirement of bonds, to other purposes by depriving the State of not more than one-third of its allocation in the event of such diversion."

This does not mean that diversion is prohibited or limited. It means that an increase in diversion subsequent to the passage of this Act would meet with the prescribed penalty. A decrease in tax diversion would have no effect so far as this Act is concerned. The penalty would apply for each year during which the increased diversion operated. The provision is for the purpose of maintaining the states' sources of highway funds as they stand or better.

Another provision of interest states that, "No deduction shall be made on account of any advances under the Emergency and Relief Construction Act of 1932 for furnishing relief and work relief to needy and distressed people." In 1932 there was passed an act which made available $120,000,000 for emergency construction on the Federal Aid highway system. The amount apportioned to the states could be used to match the regular annual Federal Aid apportionments but it was further required that the amounts so advanced would have to be reimbursed to the Federal Government over a period of ten years commencing with the fiscal year 1938. The provision quoted above exempts all states from the repayment of the funds advanced in 1932 from funds which will be available under the Hayden-Cartwright bill thus insuring the use of the entire amount for new construction.

Silas Mason Low Bidder on Grand Coulee Dam

By GRACE KIRKPATRICK

AT THE OPENING of bids June 18 for the construction of the Grand Coulee Dam, Silas Mason Company of New York City was low with a bid of $29,339,301. The Six Companies of Washington bid $34,555,582.

The low bidder's price on several of the most important items are: Diversion of river during construction, $3,500,000; 11,000,000 yards common excavation at $1.00 per yard; 800,000 yards rock excavation at $2.00 per yard; 3,100,000 yards concrete in dam at $3.00 per yard; and placing 25,000,000 lbs. reinforcement bars at 1 cent a lb.

All-American Canal Bids Opened

BIDS FOR THE construction of the All-American Canal were opened June 7 at Yuma, Arizona. This project involves the excavation of approximately 40,000,000 yards of earthwork.

The joint bid of W. E. Callahan, H. Gunther, and J. P. Shirley, St. Louis, amounting to $4,859,587 was low on schedules 1 to 6 inclusive. Unit prices were: 39,340,000 yds. of dirt at 12¼c per yard and 28,000 yds. of rock at $1.25 per yd. The low bidder on Schedule 7, involving 540,000 yards, mostly rock, was the Griffith Company of Los Angeles, with a figure of 42c per yd. for a total of $226,800. This project is to start within 30 days after receipt of notice to start work and must be completed within 1300 calendar days.

Moving earth to build a race-track near Los Angeles. In two 12-yard trailers, the "Caterpillar" Diesel Seventy-Five moves 119 yards per hour on an 800-foot haul.

"I'm going to 'Caterpillar' Diesels altogether"

● ● SAYS C. G. FULLER, CONTRACTOR, OF BARNWELL, SOUTH CAROLINA, WHO ALREADY HAS THREE "CATERPILLAR" DIESELS AND FIGURES THEIR FUEL SAVING WILL PAY FOR THEM IN LESS THAN TWO YEARS.

On a road-building and creek-diversion job near Bloomington, Ill., the "Caterpillar" Diesel Seventy-Five pulls a "Caterpillar" Grader at a fuel cost of $1.96 per 10-hour shift.

AMERICA GOES DIESEL

In the foothills of the Sierra Nevadas, in California, this "Caterpillar" Diesel Fifty supplies material to a gold separator.

Every power user is doing a lot of figuring these days. Figuring gasoline costs—figuring the savings from a tractor that burns low-price Diesel fuel, and less of it—figuring the profit that he can earn from investing in "Caterpillar" Diesel power. Many have reached the conclusion that they can't afford not to adopt this modern equipment. Today there are nearly 3000 owners of "Caterpillar" Diesels—tractors and engines. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

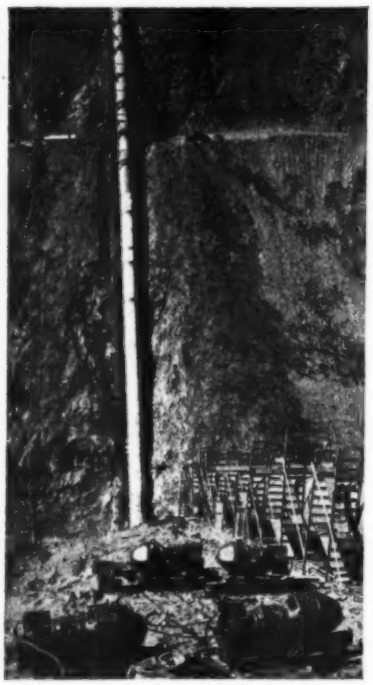
For your convenience in writing to Caterpillar Tractor Co., you will find a card bound in this issue.

Shots From the Firing Line— *Continued*

West Gets Largest Welded Pipe Line

BOUQUET DAM is being connected with the Owens Valley Aqueduct by what is said to be the largest welded pipe line in the West with a diameter ranging from 80 inches, 86 inches and 94 inches depending upon elevation. The 80-inch pipe has a thickness of 1-1/16 inches, the 86-inch 1 inch, while the 94-inch is ⅜ inch. Length of the line is 4½ miles and will connect the new dam with that of the aqueduct at the surge changer above the San Francisquito powerhouse number 1. Water will flow either into or out of the dam as occasion demands.

The country traversed by this pipe line is across steep canyons and at one point the pipe line will have a total head of 820 feet, which will make a pressure of almost 400 pounds to the square inch.



Ten Westinghouse arc welders are used on this job, which is being carried forward by three shifts of welders each working 8 hours per day. It requires 32 man-hours to weld the outside of each joint and 24 hours on the inside.

Length of each section of pipe varies to give a weight of 12 tons per section. After cleaning and painting the pipe is hauled up the canyon sides and placed into a specially designed "straddle bug" which is lowered down the canyon sides by a hoist powered with a one hundred horsepower Westinghouse electric motor.

$200,000,000 Highway Fund Apportioned to the States

ON JUNE 19th Acting Secretary of Agriculture Tugwell apportioned $200,000,000 among the 48 states, Hawaii and the District of Columbia, for highway construction. The appropriation was authorized by the Hayden-Cartwright Act, signed June 18th by President Roosevelt for highway construction under the provisions of the National Industrial Recovery Act. Following the requirements of the law, the Acting Secretary apportioned seven-eighths of the total authorization on the basis provided by the Federal Highway Act which prescribes three factors of equal weight based upon the area, population, and rural post-road mileage of the several States and Hawaii. The remaining one-eighth, as provided by law, was apportioned according to population.

The money is immediately available for allotment to construction projects on the Federal aid highway system and its extensions into and through cities and on important secondary roads. The law requires that, in the absence of satisfactory reasons to the contrary, not less than 25 percent of the apportionment to any State must be applied to secondary or feeder roads, including farm-to-market roads, rural free delivery roads, and public school bus roads.

Expenditure of the money will be in accordance with rules and regulations to be issued by the Secretary of Agriculture.

The amounts apportioned to each State, Hawaii, and the District of Columbia follow:

	Seven-Eighths According to Sec. 21 of the Fed. Hwy. Act.	One-Eighth According to Population	TOTAL APPORTIONMENT
Alabama	$ 3,722,613	$ 537,229	$ 4,259,842
Arizona	2,553,507	88,428	2,641,935
Arkansas	3,051,561	376,488	3,428,049
California	6,779,637	1,152,569	7,932,206
Colorado	3,275,724	210,282	3,486,006
Connecticut	1,128,642	326,226	1,454,868
Delaware	875,000	48,395	923,395
Florida	2,363,274	298,069	2,661,343
Georgia	4,523,020	590,471	5,113,491
Idaho	2,187,138	90,348	2,277,486
Illinois	7,372,261	1,549,140	8,921,401
Indiana	4,431,497	657,466	5,088,963
Iowa	4,616,722	501,639	5,118,361
Kansas	4,735,803	381,872	5,117,675
Kentucky	3,287,509	530,802	3,818,311
Louisiana	2,537,276	426,656	2,963,932
Maine	1,549,697	161,889	1,711,586
Maryland	1,478,833	331,225	1,810,058
Massachusetts	2,487,737	862,737	3,350,474
Michigan	5,469,502	983,066	6,452,568
Minnesota	4,905,029	520,522	5,425,551
Mississippi	3,132,202	408,025	3,540,227
Missouri	5,436,923	736,817	6,173,740
Montana	3,660,592	109,142	3,769,734
Nebraska	3,684,616	279,748	3,964,364
Nevada	2,283,870	18,486	2,302,356
New Hampshire	875,000	94,462	969,462
New Jersey	2,400,426	820,453	3,220,879
New Mexico	2,855,760	85,940	2,941,700
New York	8,772,350	2,555,571	11,327,921
North Carolina	4,197,326	643,615	4,840,941
North Dakota	2,800,745	138,222	2,938,967
Ohio	6,515,630	1,349,382	7,865,012
Oklahoma	4,198,747	486,433	4,685,180
Oregon	2,904,181	193,633	3,097,814
Pennsylvania	7,635,476	1,955,312	9,590,788
Rhode Island	875,000	139,572	1,014,572
South Carolina	2,417,958	352,996	2,770,954
South Dakota	2,906,984	140,659	3,047,643
Tennessee	3,771,790	531,201	4,302,991
Texas	11,108,746	1,182,507	12,291,253
Utah	2,029,590	103,101	2,132,691
Vermont	875,000	73,007	948,007
Virginia	3,273,714	491,673	3,765,387
Washington	2,789,019	317,393	3,106,412
West Virginia	1,929,280	351,055	2,280,335
Wisconsin	4,345,174	596,663	4,941,837
Wyoming	2,241,919	45,793	2,287,712
Dist. of Col.	875,000	98,842	973,842
Hawaii	875,000	74,778	949,778
Totals	$175,000,000	$25,000,000	$200,000,000

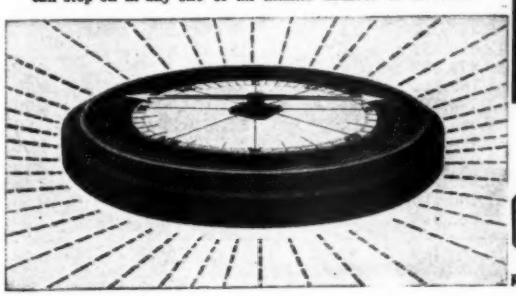
Travels sideways... as well as forward!

(. . . because its mounting has no more front or back than a circle!)

Any segment of the circular base may be the "front" of the Bucyrus-Monighan Walking Dragline's mounting. To travel sideways, the revolving frame is rotated until the walking shoes point in the desired direction—and another segment of the base becomes "front." Thus there need be no lost travel in maneuvering into position.

Because of this ability to zig-zag or move laterally to the line of the work, the Walker can complete a section at least 50% wider than its boom length, working from one side only. Bucyrus-Monighan Company, Chicago, Illinois.

With its separate circular Base, the Bucyrus-Monighan Walker can step off in any one of an infinite number of directions.



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Shots From the Firing Line—
Continued

Parker Dam to be let July 26

SEALED BIDS will be received at the office of the Bureau of Reclamation, Los Angeles, July 26, for furnishing labor and materials for the construction of the Parker Dam. The work is located near Parker, Arizona and Earp, California. The principle items of work involved are: 2,265,000 yards of all classes of open-cut excavation, 108,000 yards of tunnel excavation, 438,000 yards of earth fill in cofer dams, 22,000 yards of riprap, 287,700 yards of concrete in structures, 16,000 yards of concrete in tunnels, the placing of 1,874,000 pounds of reinforcing bars, and installing the necessary pipe, pipe fittings, spillway gates, and electrical conduit. For particulars, write the Bureau of Reclamation, Earp, California, Denver, Colorado or Washington, D. C.

Changes PWA Local Materials Restriction

LARGE SUMS of money will be saved taxpayers in construction of future public works, through an order issued by Harold L. Ickes, Public Works Administrator, that all future non-federal projects shall be awarded solely upon the basis of the lowest responsible bidders. The order rescinds former local preference regulations covering purchase of materials.

His decision was reached following a meeting of state engineers in Washington at which state industrial organizations presented objections to Buy-at-Home policies inaugurated by the Public Works Administration as "not always in the interest of employment or economy." Exception was taken to a PWA regulation for non-federal jobs which required, where available, the use of materials produced where the job was located.

It was pointed out that there were many practical objections to these local preference regulations and particularly that they established a dangerous precedent that would create a new form of economic barrier at local and state boundary lines.

The rescinding order, signed by Harold L. Ickes, follows: "Since the rule as to local preference for materials not only has worked hardship in many cases but also has frequently caused delay in the Public Works construction program * * * are hereby rescinded and the local preference for materials clause in all Loan and Grant and/or Grant Agreements now executed is hereby waived.

"As to construction contracts already let, the enforcement of the clause will be optional with the applicants. Except as otherwise provided by law, all future contracts will be awarded solely upon the basis of lowest responsible bidder. Where prices, quality and quantity are the same, applicants may select any of the low bidders or may divide the orders as they desire."

Gas-Tax Returns Show Increase

STATE GASOLINE taxes in the calendar year 1933 yielded a revenue of more than $519,000,000 as compared with $514,138,900 in 1932 according to reports collected from State authorities by the Bureau of Public Roads, U. S. Department of Agriculture. This figure does not include tax returns from the Federal gasoline tax.

Consumption of gasoline exceeded 14 billion gallons and was slightly less in 1933 than in the previous year. The weighted average tax rate was 3.65 cents per gallon. There was a noticeable increase in the diversion of funds to other than highway purposes and also an increase in funds allocated to local roads.

The total revenue was allocated as follows: To State highways, $277,517,371; to local roads, $111,109,158; to State and county roads, bond payments, $58,972,767; to city streets, $13,334,180; to costs of collection and administration, $2,727,801; and to other than highway purposes, $55,742,173.

Gasoline tax revenues by States were as follows:

STATE	Total Tax Receipts (Refunds Deducted)	Tax Rate on Dec. 31, 1933 (Cents)	Net Gallons Taxed	Percentage of Increase or Decrease in Consumption from 1932
Alabama	$ 8,033,142	6	133,885,679	— 1.86
Arizona	2,679,257	5	53,580,633	— 7.63
Arkansas	5,998,290	6	114,791,930	+33.35
California	35,217,162	3	1,173,905,406	— 2.52
Colorado	5,324,996	4	133,124,908	— 2.64
Connecticut	4,857,024	2	240,581,476	+ 2.71
Delaware	1,129,577	3	37,577,673	+ 3.41
Florida	14,292,873	7	203,561,549	— 1.79
Georgia	12,634,513	6	210,575,216	+ 5.83
Idaho	2,283,166	5	45,647,396	+ 0.20
Illinois	27,833,011	3	927,767,039	— 3.20
Indiana	16,288,646	4	407,080,056	— 2.73
Iowa	9,372,343	3	312,411,442	+ 4.48
Kansas	7,771,369	3	257,727,287	+ 4.20
Kentucky	8,316,017	5	166,293,182	+ 1.36
Louisiana	8,155,436	5	163,138,863	— 1.73
Maine	4,126,640	4	102,009,277	— 3.00
Maryland	7,207,749	4	180,193,738	— 3.90
Massachusetts	16,377,352	3	545,911,726	— 0.86
Michigan	19,485,320	3	648,615,259	— 4.76
Minnesota	10,213,636	3	333,828,560	+ 0.14
Mississippi	6,100,948	6	96,695,407	— 0.04
Missouri	9,081,135	2	454,056,751	+ 1.47
Montana	2,751,303	5	55,026,065	+ 2.27
Nebraska	7,706,261	4	192,656,526	— 1.32
Nevada	695,653	4	17,391,339	— 4.33
New Hampshire	2,349,849	4	58,746,216	—10.95
New Jersey	16,470,647	3	546,579,541	— 1.32
New Mexico	2,281,892	5	45,310,187	+ 3.34
New York	43,392,946	3	1,444,837,830	— 2.71
North Carolina	14,773,282	6	246,160,036	+ 6.23
North Dakota	1,924,830	3	64,131,714	+ 4.81
Ohio	33,939,981	4	838,020,083	— 2.18
Oklahoma	10,078,645	4	251,617,119	+ 4.18
Oregon	6,343,891	5	135,819,611	— 3.03
Pennsylvania	31,059,378	3	1,024,637,243	+ 1.48
Rhode Island	1,884,682	2	94,048,613	+ 1.45
South Carolina	6,679,326	6	111,322,101	+ 7.30
South Dakota	3,346,015	4	78,382,211	+ 5.80
Tennessee	12,979,882	7	185,426,887	+ 6.52
Texas	28,479,350	4	711,983,752	+ 5.23
Utah	2,189,714	4	54,724,960	+ 0.79
Vermont	1,766,152	4	44,153,789	— 5.79
Virginia	11,082,040	5	221,640,804	+ 2.52
Washington	10,863,214	5	217,264,282	— 1.66
West Virginia	4,927,728	4	122,991,600	— 0.45
Wisconsin	15,169,426	4	379,235,644	+ 1.48
Wyoming	1,405,415	4	35,135,367	— 0.90
District of Columbia	2,082,346	2	104,117,297	+ 2.30
TOTAL	$519,403,450	*3.65	14,224,321,270	— 0.18

*Weighted Average Rate.

Progress on Public Works Highways to June 16, 1934

PROGRESS MADE on emergency construction of public works highways to June 16 under the supervision of the U. S. Bureau of Public Roads shows a total of 8,049 projects, estimated to cost $395,405,000, had been advertised for contract, begun by day labor employed directly by the highway authorities, or completed. The cost of the day labor projects included in the above is estimated at $28,395,000.

Of the 7,611 projects awarded for construction, 5,004 were under construction on June 16, and 1,986 were completed. The work under construction, which is estimated to cost $288,014,000, was giving regular employment to 244,142 men.

In the whole country, work under way and completed involved 92.3 per cent of the $400,000,000 provided for public works highways under Section 204 of the National Industrial Recovery Act.

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come when final costs are LOW

In these days of close figuring, you can only be certain of your full profit by taking every precaution against delays and losses of time that eat up profits.

Fortunately, you can protect yourself against wire rope failures—*by specifying Hercules Red Strand.* Here is wire rope with extra life—so constructed that every wire and every strand does its full and equal part. Made of Acid Open Hearth Steel Wire, rigidly tested for strength, toughness, flexibility and wearing qualities.

Furnished in Round Strand, Flattened Strand, Preformed and Non-Rotating construction—a type to handle every job safely and economically. Specify

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Shots From the Firing Line— *Continued*

New England Notes

The Massachusetts Department of Public Works has awarded the Brimfield-Sturbridge road-project to the **New Haven Road Construction Company**, New Haven, Connecticut for $207,836; the Leominster-Sterling road-project to **R. H. Newell Company**, Uxbridge, for $164,000; the Lowell road resurfacing project to **Ellsworth Lewis**, Andover, for $110,568; and a paving project to **Arute Bros.**, Dedham, for $199,748.

The U. S. Engineers at Boston awarded an 845,000-yard dredging project in Portland Harbor to the **Bay State Dredging & Contracting Company**, East Boston, for $253,590.

Lane Construction Company, Meriden, Connecticut, was awarded a 1.4-mile road paving job near Woodford, Vermont for $40,698.

New York Notes

By G. E. PETERSON

New York State lettings since April 20th have included the following contracts: **Wheeler Engr. Co.**, N. Y. C. $132,243, bridge and paving, Chemung County; **Joseph DeGregory**, Maspeth, L. I. $66,918, grade separation on the Grand Central Parkway in Queens County; **Pallette and Santos**, Amsterdam, $49,863, bridge and paving, Sullivan and Orange Counties; **M. R. Ingraham**, Albany, $55,946, bridge and approaches in Chenango County; **Belmar Construction Co.**, Troy, $77,569, paving in city of Troy, Rensselaer County; **Geo. H. Flinn Corp.**, N. Y. C., $168,906, grade separation on the Saw Mill River Parkway, Westchester County; **Columbia Bridge Co.** Ancram, $16,655, bridge in Delaware County; **C. T. Hookway**, Syracuse, $17,680, bridge and approaches in Madison County; **Clevorock Corp.**, N. Y. C., $149,512, grade separation on Interboro Parkway in Queens County; **F. J. Crandell Corp.**, N. Y. C., $104,447, grading and structures on Meadowbrook Parkway in Nassau County; **Wm. P. McDonald Co.**, Flushing, L. I. $307,949, 2.60 miles concrete pavement in Suffolk County; **Good Roads Engr. & Constr. Co.**, Wantagh, L. I., $157,847, 1.84 miles concrete pavement in Suffolk County; **Mill Basin Asphalt Corp.** of Brooklyn, $420,908, 4.53 miles concrete pavement in Suffolk County; **John Bellardino**, Seneca Falls $121,834, 5.42 miles black top in Seneca County; **Camarco Contr. Co.** of Ossining, $83,706, 7.47 miles 18′ black top in Westchester County; **Tuckahoe Constr. Co.**, Tuckahoe, $165,-905, 15.6 miles 18′ black top in Westchester County.

Joe Meltzer, Inc., New York City, submitted low bid of $256,621 to Nassau County for 1.03 miles of paving and fill on the Meadowbrook Parkway. This job includes 400,000 yards of fill to be furnished by hydraulic dredging and transported to fills on roadway.

The Rusciano Contracting Co. of the Bronx has the contract for the excavation on the second section of the Hillside Apartment Project on Boston Post Road. This job had about 100,000 yards of excavation and was a hurry-up proposition so Mr. Rusciano put 7 shovels to work, including 4 Bucyrus-Erie 41-B steamers, a Northwest 1¼-yd. gas shovel, a 1-yd. P&H gas shovel, and an Osgood 1½-yard steamer.

Shovels on the first section of the Hillside Apartment Project include **M. Maione's** 1¼-yd. Thew steamer and 2 Lorain 75s owned by **Charles Karnes** and **Harold Tompkins.**

Jack Davis of **Ryan & Davis**, L.I.C., is spending the summer at Deposit, New York, where he is finishing his contract with Delaware County. Ryan & Davis also have their Bucyrus-Erie 43-B shovel working on the Stanley Rosoff job at Whitney Point, N. Y. Ed. Ryan is remaining in New York and has charge of their interests in the metropolitan area.

The Harris Structural Steel Company of New York has completed the steel erection on the extension of the West Side Elevated Express Highway. **The Poirier-McLane Corporation** of New York has the general contract on this job. Tom Harris, of the Harris Company, was in charge of steel erecting and used a Speedcrane along with a Bucyrus-Erie 43-B for setting the steel. Tom Foley, an old timer, by the way, in the steel work, handled the Speedcrane, and Chris Haughey was

behind the levers on the 43-B. Incidentally, Chris says the 43-B was handling as much as 42-Tons on 7 parts of line at a radius of about 12′. As a safety measure to prevent the crane from overturning backwards in the event a hoist rope broke, three drums were suspended from the rear of the revolving frame casting as shown in the photograph above. Eddie Steinmetz was Superintendent in direct charge of setting the steel. The Gerosa Haulage Company had the contract for moving the steel from R. R. cars to the job, and Eddy Kues kept the wheels turning on this end of it. The new extension of the highway runs from 39th Street to 50th Street on 12th Avenue.

Two contracts have been awarded by the Tri-Borough Bridge Authority for grading and paving on the Queens approach to the new Tri-Boro Bridge. **P. T. Cox** of New York submitted low bid of $293,360 for contract 14. The Cox contract includes about 275,000 yards of excavation which is being handled by the **James O'Connell Company** of the Bronx. Mr. O'Connell has his Bucyrus-Erie B-2 steamer and his Bucyrus-Erie 43-B 1¾-yard shovel doing the digging, and is using 6-cylinder pneumatic-tired Macks on the hauling. The low bid on contract 15 of $229,473, was submitted by the **Woodcrest Construction Company** of New York. P. T. Cox was second with a bid of $243,465. The Woodcrest contract has 311,650 yards of excavation which they have subbed to the **Aviron Company** of Brooklyn. There are additional contracts coming out on the Queens approach in the near future.

Brescia & Strada of the Bronx are making progress on their Putnam County job where they are using their 2 Bucyrus-Erie 42-B steamers.

New Jersey Notes

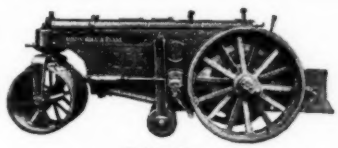
The Shark River highway bridge was selected by the American Institute of Steel Construction as the most beautiful steel bridge costing between $250,-000 and $1,000,000, constructed during 1933. The bridge was designed by Morris Goodkind, bridge engineer for the State Highway Department, and erected by the American Bridge Company. The Shrewsbury River bridge at Seabright, designed and built by the same parties, received honorable mention.

One of the first road-beautifying jobs in the State is now underway at Broadway on Route 24. The work is being done by the **A. G. Thompson Company** of Trenton under the direction of A. L. Paddock, Superintendent. The job is about 65% completed and when done will be well worth seeing. Asst. Landscape Engineer Betters for the State of New Jersey is in charge of the work. The grading was done with a ¾-yard Bucyrus-Erie shovel.

Pennsylvania Notes

Coal-stripping operations, carried on by the **Dick Construction Company** at

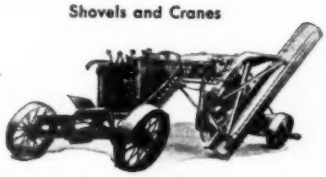
CONSOLIDATION ANNOUNCED



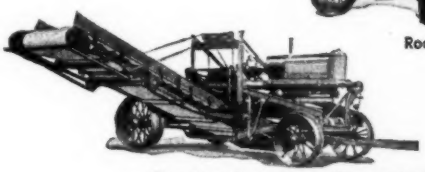
Roll-A-Plane

Shovels and Cranes

Wheelers, Scrapers and Plows

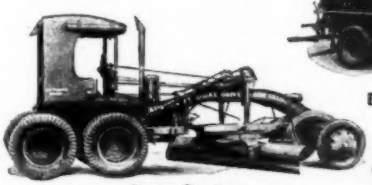


Road Graders

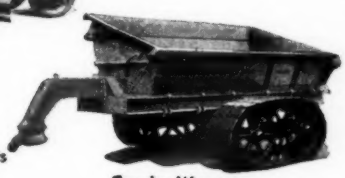


Elevating Graders

Bituminous Distributors

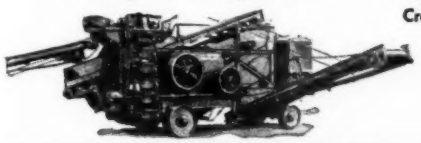


Motor Graders



Crawler Wagons

Crushing and Washing Plants



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● All members of the road building and contracting industries will observe with interest the formation of the Western-Austin Company. This new, yet familiar, name represents the unification of the Western Wheeled Scraper Company with the Austin Manufacturing Company. Duplications of departments, facilities and sales offices will be reduced.

● The Austin-Western Road Machinery Company has long handled the sales of the products of both companies and continues to do so under the new arrangement. Effective July 1st, the main offices of the Western-Austin Company and The Austin-Western Road Machinery Company will be located at Aurora, Illinois.

● This move, we feel, is not only for the benefit of the companies involved, but of the industries which they serve. The Austin-Western line has been recognized for many years as the most complete in the world. All of the machines have stood for high standards of design, construction and performance. The change announced herewith serves simply to strengthen the manufacturing set-up, simplify distribution and concentrate all service responsibility under one organization.

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Shots From the Firing Line—
Continued

Audenried, call for good teamwork between the Bucyrus-Erie 52-B Diesel shovel, the Caterpillar Diesel tractor, and the LaPlant-Choate wagon.

Maryland Notes

N. L. Diver, Durham, N. C., was low June 5 on a 5-mile road grading project in Hartford County at $127,981.

The accompanying photograph shows a breakwater stone, estimated to weigh 7 tons, being transferred from truck to railroad car at Port Deposit. A Bucyrus-Erie B-2 steam crane equipped with a rock-grab of the same make does the work easily and safely according to the officials of the **York Valley Lime and Stone Company** of Port Deposit. This company has a contract to supply 50,000 tons of breakwater stone to **Jess A. Howland and Sons Company**, Seabright, N. J., for their breakwater job at Ocean City. At the Port Deposit quarry the **Williams Construction Company**, York, Pannsylvania, has subbed the job of getting out the stone. Burl James is resident manager for the Williams Construction Company.

District of Columbia

The District Commissioners have awarded two street paving projects to **McGuire & Rolfe, Inc.**, Washington, D. C., totalling $358,016; and a street paving project to **Carson & Gruman Company**, $131,178.

Virginia Notes

R. W. Moore and Company, Staunton, was awarded the Day River bridge project for $78,798.

Georgia Notes

Whitley Construction Co., LaGrange, was awarded 9.5 miles of concrete paving in Lamar County for $153,048, and 12.8 miles in Wilkes and McDuffie Counties for $215,401.

Florida Notes

The **Florida Ship Canal** project is again active. A board, composed of a disinterested chairman, two army engineers, and two PWA engineers, has been appointed to reconcile the differences in the army's estimate of $200,000,000 and PWA's estimate of $110,000,000.

Ohio Notes

The new Port Clinton bridge over the Portage River at Port Clinton, designed and supervised by the **State Highway Department**, and built by **A. Bentley and Sons Co.**, Toledo, was accorded first honorable mention in the sixth annual award of the American Institute of Steel Construction. This award came in the classification of bridges costing under $200,000. The bridge at Port Clinton was the first of its type constructed in Ohio and is 344 feet long with a 40-foot wide vehicular passage and two five-foot walks for pedestrians. The bridge, built of steel and concrete, cost $167,800.

T. V. A. Notes

Stevens Brothers and **Miller-Hutchison Company**, New Orleans, was awarded masonry work on the north abutment of the Joe Wheeler Dam, Lock No. 3, on their bid of $187,219.

Michigan Notes

Peterson Construction Company, Minneapolis, was awarded a 9-mile road grading job in Delta and Schoolcraft Counties for $61,768. **E. B. Schwaderer**, Cass City, was awarded a 5.6-mile road project in Presque Isle County for $111,995.

Indiana Notes

The **State Highway Commission** has made the following awards: 5.8 miles grading, Jackson County, to **J. C. O'Connor & Sons, Inc.**, Fort Wayne, $133,386; 8 miles grading, Hendrick & Marion Counties, to **Lewis & Frishinger Company**, Ann Arbor, Michigan, $182,983; 1.9 miles paving, Dearborn County, to **Saradina Const. Company**, Cincinnati, $98,053; 2 miles paving, Lake County, to **Albert Construction Co.**, South Bend, $56,994; 1.15 miles paving, Knox County, to **Laughans & Lonan, Inc.**, Vincennes, $40,007.

Illinois Notes

The Cedar Street bridge over the Illinois River at Peoria was selected as the most beautiful steel bridge costing more than $1,000,000, constructed during 1933. A jury named by the American Institute of Steel Construction made the selection. The Cedar Street bridge was designed by the **Straus Engineering Company**, and supervised by the Department of Public Works and Highways.

The Division of Highways has made the following awards: 4 miles of traffic-bound paving in Calhoun County to **J. C. Bremer**, Hillsboro, $49,066; .68 mile concrete paving in Dupage County to **C. E. Giertz and Son**, Elgin, $36,906; 1.1 miles concrete paving in Cook County to **Stanley Jaicks Company**, Winfield, $79,219; 4 miles concrete paving in Will County to **Powers, Thompson Company**, Joliet, $115,129; and .75 mile grading in Peoria County to **T. M. White**, Chicago, $60,588.

By A. J. KOENIG

Following are some of the highway contracts let by the Illinois Division of Highways in May: To **Chicago Heights Coal Company** 4.98 miles paving in Lake County, $396,234; **John Mackler & Company** 1.73 miles paving, DuPage County, $74,399; **Jansen & Schaeffer**, 1.51 miles grading, Peoria Airport $56,696; **E. H. Swenson**, route 43, bridge over DuPage River, Will County, $36,724; **Jos. Kesl**, 2.99 miles concrete paving. Madison County, $94,747.

Bids will be received July 10 at the Federal Bldg., Rock Island, by the U. S. Engineers for the excavation and disposal of all loose rock and loose material (estimated quantity 410,000 cu. yds.) in the channel of the Rock Island Rapids of the Mississippi River at wing dams No. 9 and No. 39; the excavation and disposal of all material (20,000 yds.) from the Moline Pool dam; and the construction of 16 concrete block channel markers. Complete information may be had at the Federal Bldg., Rock Island, or at the U. S. Engineer's office in St. Louis, St. Paul, or Chicago.

By H. F. UNGER

Two contracts totaling $323,568 have been awarded by the Division of Highways as follows:

Route 47, 0.45 mile, paving approaches to Milwaukee subway at Stark station, Kane county, **Frenzel Bros. Company**, Chicago for $74,259.

Route 170, 8.55 miles of paving from Baldwin to Sparta, Randolph county, **Dungey and Cochran Construction Co.**, Marion for $249,309.

At the same time bids were received on a series of road and bridge construction projects totaling approximately $794,652. The apparent low bidders included:

Route U, bridge over the I & M Canal southwest of Joliet, Will county, **Powers Thompson Construction Co.**, Joliet, $29,058.

Route 0 and Route 78 paving in and south of Canton, Fulton county, **Jansen & Schaeffer**, Pekin, $23,138; 0.63 mile paving in Canton, **Jansen & Schaeffer**, $58,380.

Route 47, 1.09 miles paving from Route 9 north to pavement north of Gibson City and a gap south of Gibson City, Ford County, **Krenn & Dato Contracting Co.**, Chicago, $32,233.

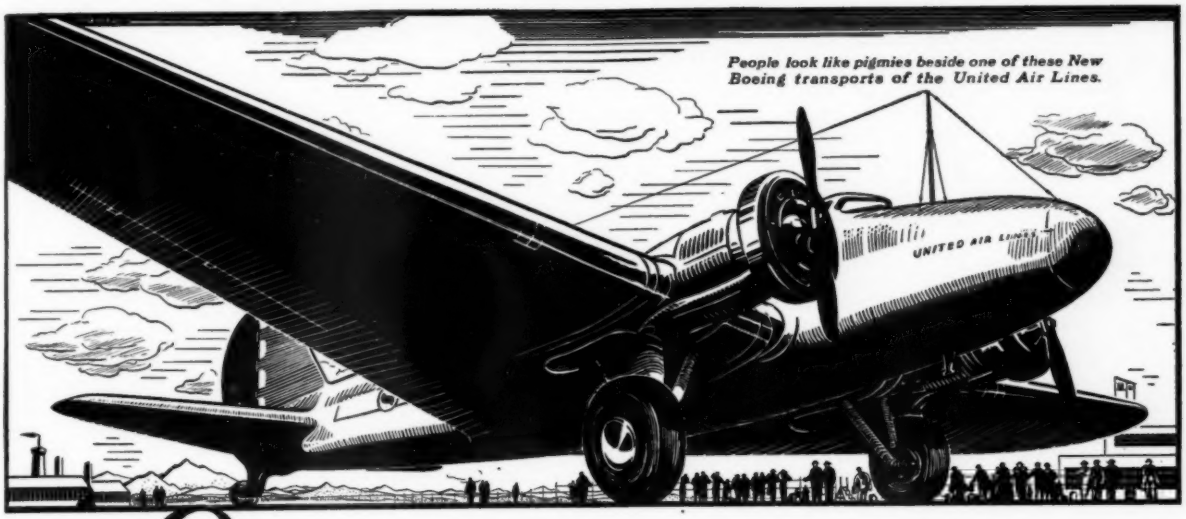
Route 97A, 0.35 mile, paving approaches to Santa Fe railroad subway at Media, Henderson county, **H. J. Eppel**, Kewanee, $18,900.

Route 109, 1.34 miles paving in Grafton, Jersey county, **Nelson Construction Co.**, Jerseyville, $17,864.

Route 156, 0.11 mile, paving gap between route 159 and 13, St. Clair county, **H. H. Hall Construction Company**, East St. Louis, $7,428.

Route 161, 3.44 miles, paving near New Baden, Jersey county, **Hoeffhen Bros.**, Belleville, $90,659.

Jo Daviess county, 1.05 miles of traffic bound surface north from Apple River Canyon state park, **Trompeter Construction Co.**, Peru, $13,322.



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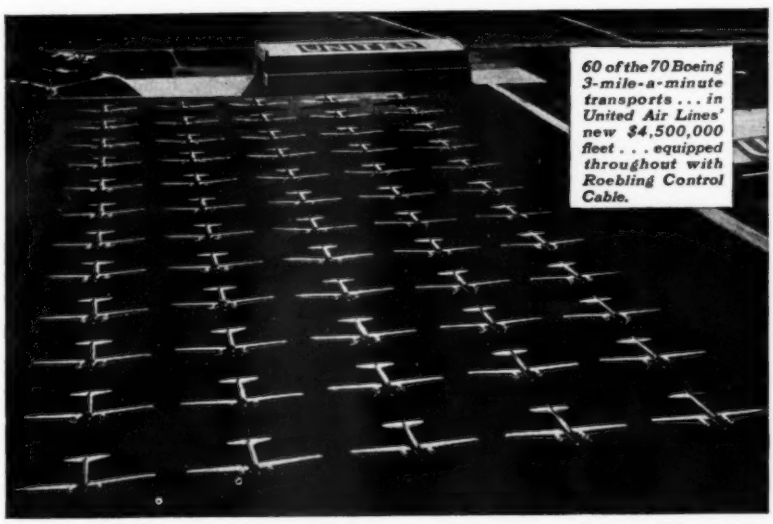

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Shots From the Firing Line— *Continued*

St. Louis and Vicinity

A record order for 4300 Hollowspun concrete tapered piles has been received by the St. Louis Works of the Westinghouse Electric & Manufacturing Company. The contract calls for delivery of the piling to Twin Locks No. 26 at Alton, Illinois. This project is a unit in the development of the 9-foot navigable channel on the Mississippi River under the supervision of the U. S. Engineers Corps. Approximately 138,000 feet of concrete piling will be driven into the river bed to support the lock walls. **John Griffiths & Son Company,** Chicago, are the general contractors.

By A. J. KOENIG

The Missouri State Highway Commission has awarded contracts for the construction of the new No. 40 highway through Forest Park. **Ambros & Maguire** has the contract for the grading at a price of $76,174 and **Fruin-Colnon** the bridges for $140,687. The estimated cost of the completed road is $1,750,000.

The contract for the sewage disposal plant and outfall sewer for the Sugar Creek Valley, St. Louis County, was awarded to **Kaplan-McGowan Co.** on their bid of $33,976.

The Senate passed a bill to revive and re-enact an act authorizing the **H. C. Brenner Rty. Co.** to construct and operate a bridge across the Mississippi near the foot of Osage St. The first authorization, granted two years ago, expired and it was necessary to revive the project, which is now said to be financed. The plans provide a lower deck for railroad trains and heavy trucks and an upper deck for light vehicular traffic and pedestrians.

Truman Const. Co. Eldorado, Kan. were awarded a contract for installing about 11,000 tons of 8½-inch steel pipe by the **Great Lakes Pipe Line Company.**

Sandy Hites Company have contract for sewer work at Springfield, Mo.

Sample & Elsea have contract for a sewage disposal plant at Fulton, Mo.

River Notes

Memphis District

On bids opened June 12 on approximately 4,800,000 yards of levee, the following contractors were low: **Hardwick and Horton,** Memphis, bid 10.34 cents per yard on the 750,000-yard upper St. Francis levee and 14.84 cents on 706,000 yards in the Lower St. Francis levee; **Fred M. Crane Company,** Omaha, 14.32 cents on the 932,000-yard Reelfoot Levee; **Mike Mitchell & Sons,** New Orleans, 15.64 cents on 690,000 yards; **R. T. Clark Company, Inc.,** and **J. W. Noble,** Fayette, Mississippi, 16.49 cents on 530,000 yards and 20.90 cents on 414,000 yards; **Driver Company,** Memphis, 17.45 cents on 800,000 yards. These last four items are on the Lower St. Francis Levee.

Kochtitsky & Johnson, Inc., Forrest City, Arkansas, submitted low bid of 25 cents per yard June 14th on the 100,000-yard Graves Bayou Levee.

Vicksburg District

A. Guthrie & Company and **Chas. Weaver** made good yardage on their levee job near Stovall, Mississippi with their 2-yard Bucyrus-Erie dragline and Caterpillar tractors hauling two 12-yard LaPlant-Choate bottom dump wagons.

Bids will be received July 10th for constructing approximately **644,000 yards** of levee on the East bank of the Ouachita River in Louisiana. This work is to be completed within 150 days.

W. F. Elkas was awarded the 77,200-yard Vicksburg City levee project on his bid of 32.7 cents per yard, June 15.

Arkansas Notes

Hartman-Clark Bros. Co., Peoria, Illinois, was awarded a 1-mile road paving job in Randolph County for $49,339; **Fred Luttjohann,** Topeka, Kansas, a 987-ft. viaduct in Union County for $126,003; **W. P. McGeorge,** Pine Bluff, a concrete bridge in Little River County for $95,152; **Parkam Construction Company,** East St. Louis, a 2,963-ft. concrete bridge in Jackson County for $143,914.

Minnesota Notes

By C. F. BARTON

On a 125,000-yard road grading project near Wabasha, **Nelson, Mullen, and Nelson, Inc.,** of Minneapolis made good progress with their Bucyrus-Erie 37-B shovel. The hauling was done with Iron Mules.

A. Guthrie & Company, St. Paul, was awarded a 775-foot bridge project at Albert Lea over the M. & St. L. R. R. tracks at $141,826. **Minneapolis Bridge Company,** Minneapolis, was awarded a 980-ft. bridge project at Willmar over the Great Northern R. R. tracks at $184,686.

Iowa Notes

Snyder & Johnson, Humboldt, were awarded a bridge project in Johnson County, $54,536.

Des Moines Asphalt Paving Company, Des Moines, was awarded 13 culverts in Shelby and Harrison Counties for $25,402 and a multiple-span bridge on U. S. 20 at Fort Dodge for $87,973.

North Dakota Notes

W. Collins, Fargo was awarded 21.3 miles of grading in Sargent and Dickey Counties, $49,384. **Northwest Construction Company,** Bismarck was awarded 3 road projects totaling $57,500.

South Dakota Notes

The State Highway Commission has made the following awards: 14.3 miles paving in Minnehaha County, $292,181, to **C. A. Wagner Construction Company,** Sioux Falls; 7.6 miles grading in Custer County, $46,165 to **G. W. England and Son, Trotman Bros.,** and **W. Bonesteel,** Murdo; 9.1 miles grading in Turner County, $22,767, 6.1 miles grading in Duel County, $13,233, 4 miles grading in Miner County $6,894, all to **Edward Gustafson Construction Company,** Sioux Falls; 36 miles oil surfacing (5 projects) totaling $158,544 to **Yant Construction Company,** Omaha.

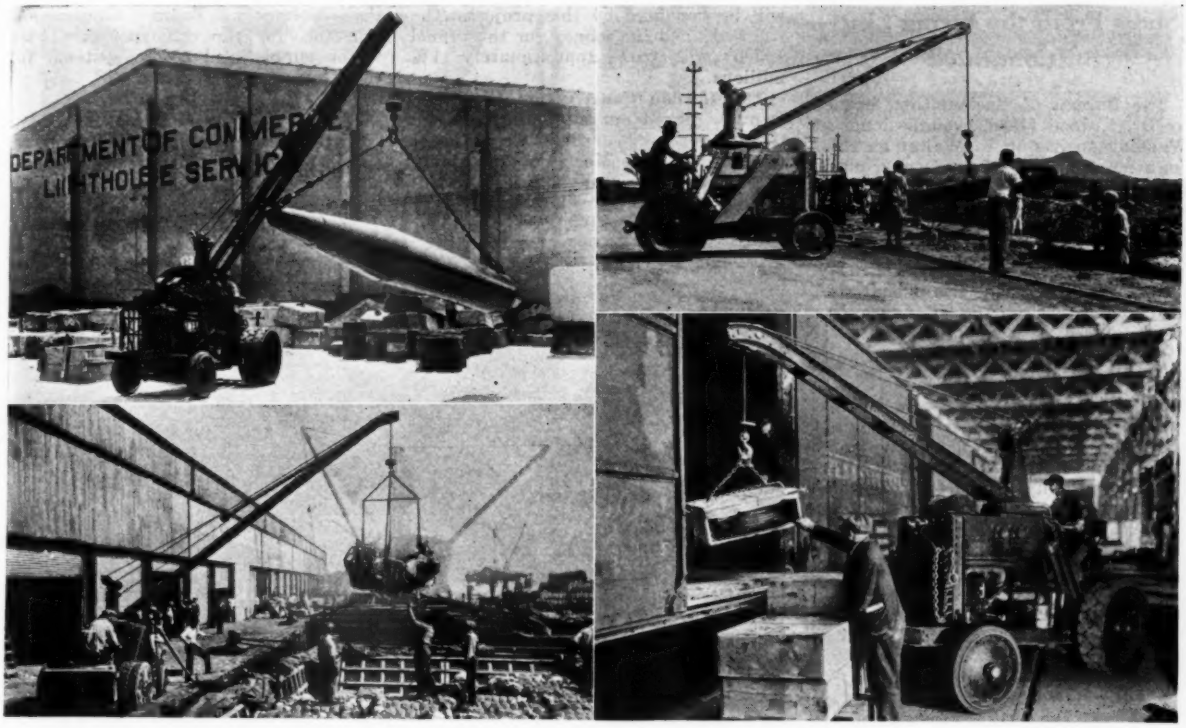
On bids received June 14 the Commission made the following awards: 1.6 miles concrete paving in Hughes County to **Summit Construction Company** of Summit and **Central Construction Company,** Sioux Falls, for $53,954; 8.77 miles grading in Pennington County to **Chaulk & Birdsall,** Lead, for $131,382; 17.5 miles grading (3 projects) in Clark and Beadle Counties to **Sorenson & Stull,** Trent, for $45,620; and 14.5 miles grading in Lincoln County to **S. E. Gustafson,** Beresford, for $54,704.

Nebraska Notes

The State Department of Roads and Irrigation has made the following awards: 21.7 miles bituminous paving to **D. H. Hardman,** Alton, Kansas, $76,589; 25.2 miles to **Roberts Construction Company,** Lincoln, $127,872; 10.6 miles gravel surface to **Roadmix Construction Company,** Shenandoah, Iowa, $36,258; 2 bridges to **G. W. Condon,** Omaha, $46,586.

Colorado Notes

The chief field office of the Bureau of Reclamation, Department of the Interior, at Denver, Colorado, is the largest single engineering office in the world, with a staff of 664 and an annual payroll of $1,000,000. These engineers are engaged in investigations of proposed irrigation, power and flood control projects, and in the preparation of plans and specifications for the execution of projects already approved, appropriations for which have been allotted by the Public Works Administration. The construction program amounts to approximately $200,000,000.



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For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

Shots From the Firing Line—
Continued

The Bureau of Reclamation, headed by Dr. Elwood Mead, Commissioner at Washington has R. F. Walter as chief engineer in charge of the Denver office. His assistants are S. O. Harper, Assistant Chief Engineer; J. L. Savage, Chief Designing Engineer; L. N. McClellan, Chief Electrical Engineer; E. B. Debler, Hydraulic Engineer, and C. M. Day, Mechanical Engineer. His official staff also includes legal and administrative assistants.

Prior to 1933 the engineering office at Denver numbered 150, and it was from this nucleus that the present large force has grown. Twenty-eight irrigation projects in sixteen states have been undertaken and either partially or wholly completed of which the Boulder Canyon project is the largest and best known.

Here we see **Platt Rogers, Inc.**, Pueblo, digging the approach to the west portal of a 3½-mile irrigation tunnel through the Continental Divide near Aspen. The work is being done at an elevation of 11,000 feet. When finished the tunnel will carry 60,000 acre feet of water annually from the Roaring Forks River on the west slope to the head waters of the Arkansas River on the east slope. Here the water will be stored for irrigation purposes in Crowley County. Some 56,000 acres will be benefited by this project. The R.F.C. loaned the money for the tunnel which will cost approximately 1½ millions.

The Gordon Construction Company, Denver, picked out a tough job when they undertook the Bear Creek highway project near Morrison. In cutting a road along the canyon wall the Bucyrus-Erie 37-B shovel, powered with a Caterpillar Type D-11,000, 6-cylinder

Diesel engine, sidecasts part of the granite rock and dirt into the canyon alongside as illustrated and loads the remainder of the cut into trucks.

Idaho Notes

The Utah Construction Company, Ogden, was awarded an 8.8-mile road project in Owyhee County for $186,294. **The Interstate Engineering and Construction Company**, New Port, Washington, received award for constructing a 250-foot span steel bridge over Coeur d'Alene River at $65,173. **Morrison-Knudsen Company**, Boise and **J. C. Magire**, Butte, were awarded a 1.65-mile road project near Yellowstone Park amounting to $150,972.

Grand Coulee Dam Notes

Bids will be received by the **Bureau of Reclamation** July 2, at the office of the Columbia Basin Commission, Spokane, for the construction of the water supply and sewer systems for the Grand Coulee camp.

Oregon Notes

Harold Blake Company, Portland, received award for widening 2.3 miles of the 82nd St. Highway in Portland for $124,736.

The **Columbia Construction Company**, Reno, Nevada, was awarded the Bonneville spillway dam, $8,972,650.

Teufel & Carlson, Seattle, submitted low bid on June 7 of $551,224 for the construction of a bridge over the Umpqua River, Douglas County; also low bid of $471,871 for the Siuslaw River bridge in Lane County.

Sealed bids will be received at the office of the Bureau of Reclamation, Ontario, Oregon, July 12 for the construction of earthwork laterals, tunnel, and structures on the **Owyhee project** near Adrian, Oregon. The principle items involved are as follows: 282,000 yards of all classes of excavation for laterals, 1,150 yards of concrete, and laying 11,270 lineal feet of 15-inch to 48-inch concrete pipe. The work must be completed in 250 days.

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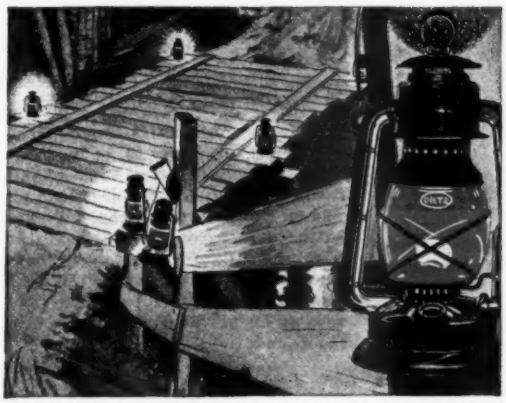

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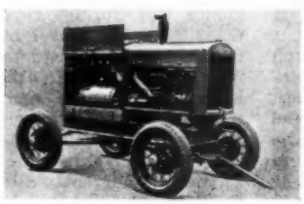

The Rock County (Wisconsin) Highway Commission has had a P & H-Hansen Arc Welder in their shop for three years. Here's what Charles E. Moore, the Commissioner, says about it:

"We have come to regard it as the most useful repair unit we have for special and general repair work.

"We found that our men learned quickly to use it and it is in service almost every day. No sum could buy it from us if we could not get another."

And because of their wide welding range and ease of operation, you can put a P & H-Hansen to work on construction work: building bridges and structures, fabricating tanks and culverts, etc. Write today for full particulars.

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Shots From the Firing Line—*Continued*

The Dr. John D. McLoughlin bridge at Portland was selected by the American Institute of Steel Construction as the most beautiful steel bridge built during 1933, costing less than $250,000. The bridge was designed by C. B. McCullough, bridge engineer for the State Highway Department, and erected by Poole and McGonigle of Portland.

Washington Notes

ALBERT C. GOERIG

Albert C. Goerig, one of the most prominent excavating contractors of the Pacific Northwest, died late in May at his home on McGilvra Boulevard, Seattle, at the age of seventy years. Among his major excavation activities in Seattle were those for the Bon Marche department store, the Savoy Hotel, the American Bank Building, and the Northern Life Tower. In addition he built many miles of road for the Federal government, as well as numerous street improvements in the city of Seattle. Extending his field of usefulness outside of Seattle, he recently constructed a traffic tunnel for the improvement of Wawona Road in the Yosemite National Park of California.

One of his most distinguished projects was the building of Fort Casey during the year 1897, which included the emplacement of batteries of disappearing and barbette rifles and mortars, which were the latest thing in national defense in the "Nineties."

The Director of Highways has made the following awards: 21.7 miles stone surfacing in Lincoln and Grant Counties to **Triangle Construction Company** of Spokane for $42,968; 14.8 miles macadam surfacing in Mason County to **J. F. Forbes** of Olympia for $59,403; 32.9 miles seal coat in Kitsap and Jefferson Counties to **F. J. Kernan** of Faloma, Oregon, for $45,311; and 17.3 miles grading and structures in Grays Harbor County to **L. J. Dowell, Inc.**, of Seattle for $300,176.

Fort Peck Dam Notes

Mason-Walsh Company, Glasgow, Montana, have started preliminary excavation for their $7,000,000 diversion-

tunnel job. Here we see one of their Bucyrus-Erie 43-B shovels loading a Mack truck.

Morrison-Glasscock-Connor Company of Kansas City submitted low bid June 15 of $143,718, for the construction of the left bank trestle for the upstream toe of the dam.

Arizona Notes

By D. I. DAY

The view above shows the fine road awaiting tourists to the Grand Canyon. This is U. S. 89, the main north and south route through Arizona, connecting the Grand Canyon and the nearby National parks in Utah.

The section shown in the photograph runs from Fredonia to the Grand Canyon bridge, a distance of 18.7 miles. This section was built by **Hodgman and McVicar** of Pasadena, California who did the grading and surfacing, and **Packard and Tanner** of Phoenix, who built the bridge and culvert structures.

New Mexico Notes

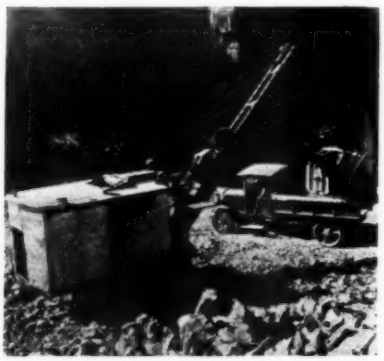
The State Highway Department made the following awards June 6; **Kirchhof-Hanes, Inc., & J. H. Miller**, Albuquerque, 2.5-mile road project in Socona County, $64,988; **Wheeler, Carrico & Silver**, Albuquerque, 1.9-mile road job in Sandoval County, $35,775; **Cook & Ransom**, Ottowa, Kansas, road project NRS-208, $10,805; **H. Thygesen**, Albuquerque, road project NRS-222-B, $27,540.

Boulder Dam Notes

The Six Companies, Inc., within a year after starting to pour concrete, have placed better than 2 million yards. A million yards was placed during the last 5 months, an average of 200,000 yards every month. The schedule calls for the placing of another million yards during the next six months. Operations are carried on now at an elevation of 404 feet above the foundations.

Wyoming Notes

By D. H. DAUBERT



In the picturesque Glen Creek Gap just north of Rustic Falls near Mammouth Hot Springs this Bucyrus-Erie GA-3 1¼-yard shovel is widening the Golden Gate Route in the Yellowstone National Park. The blasted rock is loaded into trucks and hauled to a nearby crusher. The crushed rock is then used for surfacing the roads. The Gas+Air shovel is owned by J. L. McLaughlin of Great Falls, Montana. B. C. Knox is the shovel runner.

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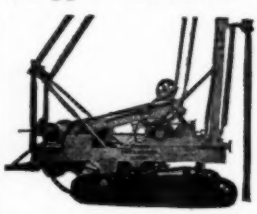
The Loomis Machine Company
K Street Tiffin, Ohio
Established 1842

By C. F. BARTON

A new road in the Yellowstone National Park is being built by Stevens Brothers of St. Paul. The road runs from Canyon Junction on the Yellowstone River toward Yellowstone Lake for a distance of 12 miles. The excavation involved is approximately 217,000 yards. The photograph shows a Bucyrus-Erie 37-B shovel loading into Mack trucks.

San Francisco and Vicinity

By H. L. LIVINGSTON

The Six Companies, San Francisco, who bid $3,683,931 to the Joint Highway District No. 13 have been awarded the contract for the construction of a highway, highway tunnel and approaches from Broadway & Keith Avenue, Oakland, to a point 1400 ft. northerly from Fish Ranch Road in Contra Costa County. The highway tunnel will be the twin bore type, each bore 35 feet overall width and 34 feet high.

Bids will be called for in July by the Public Utilities Commission, City Hall, San Francisco, for the enlargement of the **O'Shaughnessy Dam** by raising its height 85½ feet. The estimated cost of this work is $3,500,000.

The following contracts have been awarded by the California Division of Highways:

R. E. Campbell, Los Angeles, $105,296 for 5.6 miles of grading between Escondido and Lake Hodges Dam, San Diego County.

Basich Brothers, Torrence, $150,290 for 2 miles of grading and asphalt concrete paving in Los Angeles County.

L. C. Seidel, Oakland, $29,597 for reinforced concrete bridge in Santa Barbara County.

Union Paving Company, San Francisco, $78,846 for 3.2 miles grading and paving with selected material in San Luis Obispo County.

United Concrete Pipe Corporation, Los Angeles, 2 projects, $234,247 for 7.9 miles and $293,563 for 5 miles grading and paving in Los Angeles County.

Contoules Construction Company, San Francisco, $106,683 for 6.3 miles of grading in Kern County.

The Los Angeles Board of Public Works on June 13 awarded two grade-separation projects to **Person & Thiel** for $152,493.

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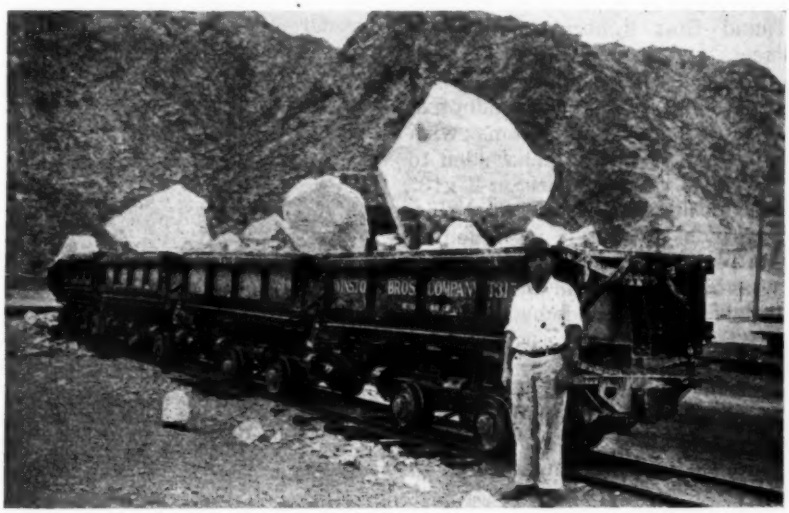
For Used Equipment
see
Excavating Engineer

For Sale and Bargain Counter Section
(Pages 346-347 and 349-351)



The photograph above shows the size of some of the rocks **Winston Brothers Company** excavate in their section of the Iron Mountain Tunnel on the Colorado River Aqueduct. After drilling and blasting, the rock is mucked out with a Bucyrus-Erie 1¼-yard electric tunnel shovel loading into Western dump cars.

Bids will be opened in July for the construction of the **Rye Patch Dam** located on the Humboldt River northeast of Lovelock, Nevada. This dam is to be of the embankment type 60 feet above stream bed, crest length of 630 feet and crest width of 30 feet. The Public Works Administration has allotted $2,000,000 for this project.

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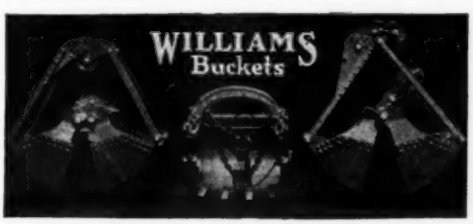

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7002 Central Ave., Cleveland, Ohio

Whitewater Tunnels Dug Through Gravel

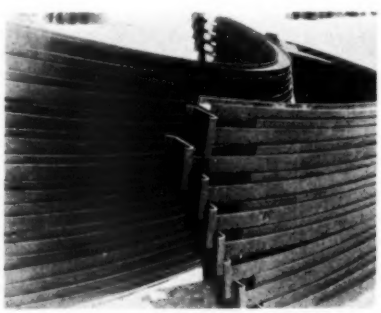
(Continued from Page 319)

H. E. Carlton, general manager for the West Construction Company, is responsible for the rapid progress being made in holing through No. 2.

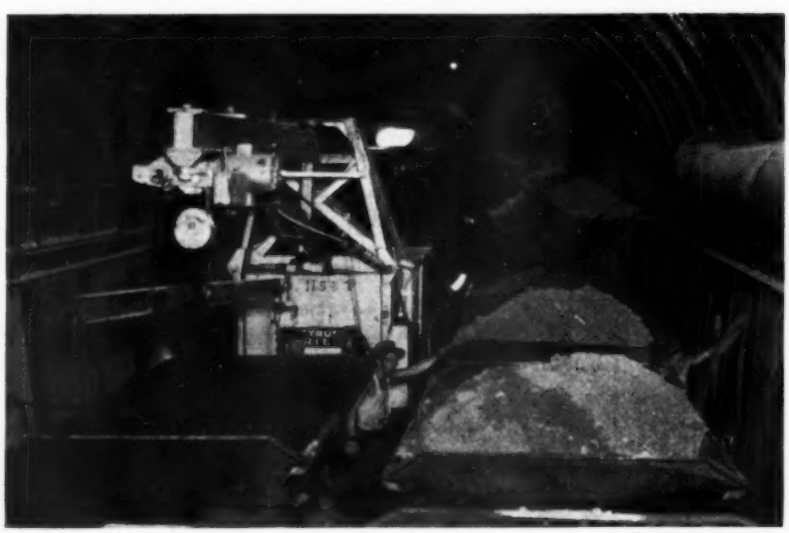
a short distance south of the portal. The dumping tracks are shifted frequently to the outer edge of the embankment so that the cars can be dumped quickly.

Tunnel lined with steel

For about a thousand feet in from the portal 6"x8" I-beams are used for wall-plates, with a 2"x4" channel, welded flange up, on top to receive the ends of the 4"x4" liner plate ribs. Liner plates are 3/16-inch steel, 16"x36". It was found that lighter steel would meet the requirements, and accordingly ⅛-inch liner plates and 6"x6" wall plates were adopted. Posts are of 4"x4" I-beams, with a plate of ½-inch steel welded to each end. They are set on 8"x10" foot-blocks with 2"x10" mud-sills. Two-inch lagging is used behind the posts. It was also found that a saving in time and welding materials could be made by welding a flanged steel plate to each end of the liner-plate ribs, so as to fit over the top of the wall-plates instead of into a channel, without any loss of safety. Turnout switches have been installed about 2,000 feet apart in the tunnel. Wiring for lights is bracketed to the lower flange of the wall plate on the left of the tunnel, while the 20-inch steel blower-pipe is suspended from liner-plate bolts on the right. The high-pressure air-line and water-pipe are carried along the right side at the floor. Most of the blower line outside the portal has been roofed over to keep off the desert sun, so that cool, fresh air can be supplied to the workmen. During the summer months in the desert the thermometer hits one hundred practically every day and even a temperature of 130 degrees has been experienced. However, underground in the tunnel the men work in a temperature varying from 78 to 100 degrees.



Time is saved placing liner-plate ribs in the tunnel by first welding on flanged steel plates to each end of the ribs.



The tunnel shovel besides mucking out the gravel does equally valuable work at the rear. Here the car-transferring-crane or "cherry-picker" swings the empties over to the loading track in practically no time at all.

Shops are near portal

Near the dump is located the battery-charging shed where the Ironclad Exide batteries are charged by a 40-h.p. 126-volt generator made by Electric Products Company. Two spur-tracks enter the shed, with three trestles for the battery sets, which are handled with Yale spur-geared 5-ton blocks, using a 10-foot section of 4"x10" I-beam, reinforced at ends and middle and with clevises for suitable hooks, which are on short chains at the ends of the beam. A Yale spur-geared block is also used on an overhead beam outside the shed for removing and loading heavy materials on the cars. A passenger car, equipped with seats, transports the men to the face. Back of the battery shed is the blacksmith shop, equipped with Sullivan forge and sharpening machine, another forge with a Champion blower, for small tools, an Oxweld outfit, Green Band grinder and a Champion hand drill-press. Nearby is storage space for timber and steel liner-plates. A Smith-Booth-Usher cut-off saw, with 18 and 20-inch saws, is used in preparing timbers, and is driven by a G.E. 5-h.p. motor. At the steel station a Wilson "plastic arc" electric welder is used to weld the flanged plates on the liner ribs. There is also a bench where the holes in liner-plate flanges are reamed to ⅞" to facilitate erection in the tunnel. Reaming is done by shoving the edge of the plate against a reamer in a Stanley electric drill, which is clamped to the bench. With this device one man is able to ream some 500 plates per day, 6 holes to a plate.

Explosives are handled in three separate houses, strung along the hillside adjacent to the dump, at intervals of about 400 feet. These buildings are well ventilated because of the desert heat, and have double walls and roof, filled in with gravel and covered on the outside with galvanized corrugated iron. Powder is stored in one, caps in another, and the third building is used to make up the primers, ready for use in the tunnel.

Air-conditioned camps

North of the tunnel portal are located the 40-men Threlkeld air-cooled camp, with 40 by 80-foot dormitory, 30 by 30-foot recreation hall and a 30 by 60-foot kitchen and dining room, equipped with modern refrigerators and ice-making plant. Water is supplied by two 5,250-gallon tanks above the camp and is secured from a pipe-line leading to Palm Springs from Whitewater River. Part of the force of about 85 men live at a tourist camp about a mile from the tunnel. Three shifts are worked, the men changing off every two weeks.

Also north of the portal are the office building, change house, compressor room, transformers, oil house and blower room. The Connersville blower is driven by a 20-h.p. Sterling motor. Power for operating the machinery on this project is supplied by the District from its high voltage line that parallels the route of the Aqueduct. A bank of transformers, 750-KVA capacity, steps the 33,000-volt current down to 2300 volts. Additional transformers convert the 2300-volt power to 440 for motors, etc., while a number of dry-type 2200/110-volt transformers handle the lighting load.

The portals and camp are about half a mile north of U. S. Highway 99, and are plainly seen from the bridge across the Whitewater, just east of Whitewater post office.

F. E. Weymouth is general manager and chief engineer for the Metropolitan Water District; J. C. Bond, construction engineer at Banning, field headquarters; B. C. Leadbetter, division engineer for this division; B. A. Eddy, resident engineer; H. E. Carlton, general manager for the contractors; A. McLeod, office manager, and Angus McDonald, tunnel superintendent. H. W. Parker is inspector and engineer for the District, at the tunnel.

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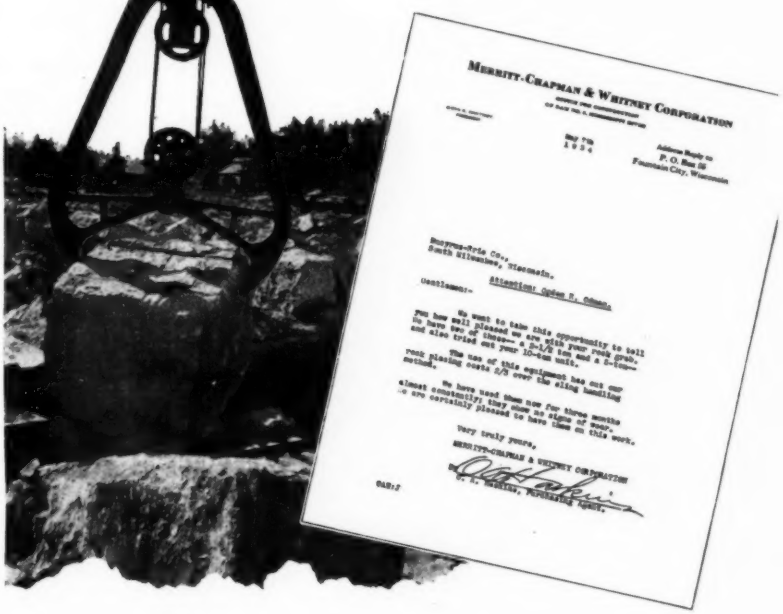

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Hubby: "Yes. Well, that's the only part of [illegible] my that'll ever set o[illegible] Earth Mover.

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P&H MODEL 208—45′ BOOM DRAGLINE—Cats—15½′ long, 9′ wide, 22″ Treads. 100 HP. Waukesha High Alt. Engine. SCD-1.

P&H MODEL 208—45′ BOOM DRAGLINE—4-cylinder 7¾″x9″ Twin City gasoline engine and 1½ cu. yd. Omaha bucket. SCD-20.

BUCYRUS-ERIE 30-B DIESEL 40′ BOOM DRAGLINE. SCD-21.

MONIGHAN MODEL 1-W WALKER—60′ Boom Dragline, 1¼ cu. yd. Page Bucket. Good condition. SCD-13.

SPEEDER MODEL B-2 Gasoline—½ cubic yard Shovel. Weight approximately 31000 pounds. Good mechanical condition. SCD-23.

BAY CITY "PUP" GASOLINE CLAMSHELL. Good mechanical condition. SCD-24.

BYERS "BEARCAT" Gasoline ⅝-yard Shovel. Hercules engine. Overhauled. Good mechanical condition. SCD-25.

THEW-UNIVERSAL MODEL 35 — Gasoline — ½ cubic yard standard shovel equipment—25′ lattice type crane boom and ½ yard Williams bucket with teeth—complete drag shovel attachment and skimmer scoop bucket, including home-made trailer. Excellent condition. SCD-26.

BUCYRUS-ERIE MODEL 30-B DIESEL SHOVEL—25′9″ Boom, 14′ Dipper Handle, 1 yd. Dipper. SCD-9.

KOEHRING MODEL 1—30′ Boom Gasoline Crane. Cat Mounted—No Bucket—4½″x5″ Wisconsin Engine. SCD-19.

Shovel Equipment

¾ CU. YD. DIPPER—20′ boom—13′ Dipper Handle—rope crowd shovel equipment. Suitable for models 1030 or 1035—brand new. SE-1

¾ CU. YD. DIPPER—23′ BOOM—15′ DIPPER HANDLE—Extra High Lift Rope Crowd Shovel Equipment suitable for Models 1030 or 1035. Brand New. SE-2.

¾ CU. YD. DIPPER—23′ BOOM and ENGINE —12′6″ DIPPER HANDLE—Shovel Equipment suitable for 20-B Steam. Brand New. SE-15.

COMPLETE FRONT END EQUIPMENT

¾ CU. YD. DIPPER—26′ BOOM and ENGINE —17′ DIPPER HANDLE — High Lift Shovel Equipment suitable for 30-B Steam. Brand New. SE-16.

¾ CU. YD. DIPPER—25′9″ BOOM—14′ DIPPER HANDLE—Shovel Equipment suitable for 30-B Diesel. Brand New. SE-17.

⅞ CU. YD. DIPPER—21′9″ BOOM and ENGINE—15′ DIPPER HANDLE — High Lift Shovel Equipment. Suitable for 31-B Steam. Brand New. SE-18.

1 CU. YD. DIPPER—20′ BOOM—15′ DIPPER HANDLE — Rope Crowd Shovel Equipment, suitable for Osgood "Conqueror." Good mechanical condition. Low Price. SE-24.

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1 CU. YD. DIPPER—24′ BOOM—18′ DIPPER HANDLE—Slightly used but good conditioned. Suitable for any Bucyrus-Erie GA-2 or GA-3 Machine. SE-25.

1 CU. YD. DIPPER—24′ BOOM—16′ DIPPER HANDLE—Rebuilt and Guaranteed. Suitable for application Bucyrus-Erie GA2 or GA3 Machines. SE-26

1¼ CU. YD. DIPPER—22′6″ BOOM—16′ DIPPER HANDLE—Rebuilt and Guaranteed. Suitable for application Bucyrus-Erie GA2 or GA3 Machines. SE-27

1¼ CU. YD. DIPPER—25′ BOOM—17′ DIPPER HANDLE—Slightly Used Rope Crowd High Lift Shovel Equipment suitable for Model 37-B. New Machine Guarantee. SE-5.

1½ CU. YD. DIPPER—23′6″ BOOM—15′ DIPPER HANDLE—Slightly Used Rope Crowd Shovel Equipment suitable for Model 37-B. New Machine Guarantee. SE-6.

1½ CU. YD. DIPPER—27′ BOOM—17′ DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable only for Bucyrus-Erie 43-B machines. Rebuilt—New Machine Guarantee. SE-23.

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Dragline Equipment

35′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-2.

40′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-3.

40′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model E-2. Brand New. DL-6.

45′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model E-2. Brand New. DL-7.

40′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model 30-B Diesel. Brand New. DL-8.

45′ CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model 30-B Diesel. Brand New. DL-9.

BRAND NEW Ropes included with each of above Dragline Equipments.

All of above equipment is BRAND NEW and of BUCYRUS-ERIE manufacture.

Trench Digging Equipment

1 CU. YD. 42½″ WIDE—Solid type Dipper—24′ Boom and all auxiliary equipment. Will dig maximum depth 22′. For application to GA-2 or GA-3 Shovel. Rebuilt—New Machine Guarantee. DS-5.

BRAND NEW PAGE, two dippers each ¾ cu. yd., one 38″ wide over cutters, the other 49½″ wide over cutters. 17′1½″ Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030 or 1035. DS-7.

1-CU. YD. 42½″ WIDE SOLID TYPE DIPPER —24′ Boom and all auxiliary equipment—will dig maximum depth of 22′—For application to GA-2 or GA-3 Clam Shell or Drag Line. Rebuilt —New Machine Guarantee. DS-8.

BRAND NEW Ropes included with each of above Trench Digging Equipments.

DIPPERS

Small Machines

2 ⅝ CU. YD.—Plate.—Will fit 20-B Steam or Gas. Brand New. D-12

1 2/3 CU. YD.—Plate front.—Will fit 14-B. Brand New. D-13

1 ¾ CU. YD.—Rock Type.—Will fit 20-B Steam or Gas. Brand New. D-15

3 ⅞ CU. YD.—Plate front.—Will fit 1030 or 1035. Brand New. D-16

2 ⅞ CU. YD.—Plate front.—Will fit 1030 or 1035. Brand New. D-18

1 ⅞ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 1030 or 1035. Slightly used. D-36

1 ⅞ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 1030 or 1035. Brand new. D-37

1 ⅞ CU. YD. Cast Front Inserted Tooth. Will fit B—B-2—B-3 and GA-2. D-19

1 ⅞ CU. YD.—Plate Front. Will fit 18-B. Brand New. D-20

1 ⅞ CU. YD.—Rock type. Will fit 31-B. Brand New. D-21

2 1 CU. YD.—Cast Front Inserted Tooth Dippers. Rebuilt and Guaranteed. Suitable for application GA2 or GA3 Machines. D-34

1 1¼ CU. YD.—VAN PORT—ROCK TYPE. Will fit E-2, 41-B or 42-B. Slightly Used. D-26

2 1¼ CU. YD.—VAN PORT—ROCK TYPE. Will fit E-2. Brand New. D-27

1 1¼ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 37-B. Slightly used. D-38

1 1½ CU. YD.—PLATE. Will fit E-2. Brand New. D-28.

1 1½ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 43-B. Slightly used. D-39

2 1½ CU. YD.—Manganese Front Inserted Tooth. Will fit E-2, 41-B or 42-B. Slightly Used. D-29

1 1½ CU. YD.—Vanderhoef type with Vanderhoef teeth. Will fit E-2 or 42-B. Slightly Used. D-30

Large Machines

1 2½ CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Can be used on 68-C and 70-C machines. Brand New. D-1.

2 3 CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Can be used on Model 100-B, 68-C, 70-C Machines. Brand New. D-2.

1 3½ CU. YD.—Front 2¾" Nickel Chrome Steel, two part Van Port Reversible Teeth. Can be used on Model 88-C, 95-C, Class 180. Brand New. D-3.

1 4 CU. YD.—Front 2¾" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Has seen some service but in good condition. Can be used on Model 100-C, 120-B. D-4.

1 4½ CU. YD.—Lip 2¼" Manganese Steel, two part Reversible Manganese Teeth. Can be used on Model 88-C, 110-C. Brand New. D-5.

3 6 CU. YD. Molybdenum Steel Front, Annealed Cast Steel Back, two part Reversible Van Port Teeth. Can be used on 225-B and 320-B. Brand New. D-11.

1 8 CU. YD.—Front Molybdenum Steel, two part Van Port Reversible Teeth. Can be used on Model 320-B. Slightly Used but excellent condition. D-6.

DRAGLINE BUCKETS

BRAND NEW

1 ⅝ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 890 lbs. DB-11

2 ¾ CU. YD. PAGE CLASS "C." Approximate weight each 2425 lbs. DB-1

1 1½ CU. YD. PAGE CLASS "C." Approximate weight 4540 lbs. DB-3

3 2 CU. YD. PAGE CLASS "C." Approximate weight each 5630 lbs. DB-4.

1 2 CU. YD. OMAHA STANDARD. Approximate weight 4300 lbs. DB-5.

1 2¼ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 3850 lbs. DB-13.

1 2½ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 4600 lbs. DB-14.

REBUILT

1 1¾ CU. YD. OMAHA STANDARD. Approximate weight 3800 lbs. DB-7.

1 2 CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 4600 lbs. DB-12.

1 2½ CU. YD. BUCYRUS-ERIE INSERTED TOOTH. Approximate weight 6500 lbs. DB-9.

1 2½ CU. YD. OMAHA STANDARD. Approximate weight 5400 lbs. DB-10.

BOILERS

BRAND NEW

Will Make That Old Shovel Work Like New.

Can Also Be Used for Miscellaneous Service.

Vertical Type

3 42"x88"—35 H.P.—144 lb. Working Pressure. Mass. Std. Will fit Type B Shovel. B-2.

1 44½"x88½" fitted with extended fire box for burning wood. Can be used for coal or coke. **37 H.P.—144 lb. Working Pressure. ASME Std. Can be installed on Type B Shovel.** B-3.

1 44½"x88½"—37 H.P.—145 lb. Working Pressure—Canadian Standard. Will fit B or B-2. B-4.

1 46½"x88½"—37 H.P. 150 lb. Working Pressure. Massachusetts Standard. Will fit any B-2 or B-3 Machine. B-7.

3 46½x110"—40 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3. B-9.

1 54"x100"—41 H.P.—125 lb. Working Pressure. ASME Std. Will fit B-2 or B-3. B-11.

1 58"x7'9'—70 H.P.—150 lb. Working Pressure. Mass. Std. Will fit 42-B Machine. B-12.

Locomotive Type

3 44"x17'—75 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 68-C. B-13.

1 44"x18'—88 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 70-C. B-14.

2 54"x11'3"—92 H.P.—125 lb. Working Pressure. ASME and Mass. Std. Will fit Model 50-B Machine. B-16.

ELECTRICAL EQUIPMENT

MOTOR—GENERAL ELECTRIC—3 phase, 25 cycle, 550 volt, 1500 RPM., 90 HP., BRAND NEW. EE-1.

50 KW MOTOR GENERATOR SET—GENERAL ELECTRIC—consisting of 3 phase, 60 cycle, 440 volt, 1170 RPM., 75 HP., Induction Motor connected to 50 KW, 250 volt, 1200 RPM., Generator, including suitable rheostat and compensator. BRAND NEW. EE-2.

COMPENSATOR — GENERAL ELECTRIC—75 HP., 2220 volt, 3 phase, 25 cycle, manual type. BRAND NEW. EE-3.

TRANSFORMER—GENERAL ELECTRIC — 5-KVA. 2200-3810 volt primary, 440-220 volt secondary—3 phase, 60 cycle, with cast iron tank and cover, including specially fastened bushings to prevent oil leakage. BRAND NEW. EE-4.

GENERATOR — WESTINGHOUSE — 125 KW, 250 volts, 500 amperes. Direct Current. 440 RPM. Includes two outboard bearings. BRAND NEW. EE-5.

MOTORS (2) — GENERAL ELECTRIC — 21.5 H.P. 3 phase, 60 cycle, 440 volt, 900 RPM. Totally enclosed—ball bearing. BRAND NEW. EE-6.

AIR COMPRESSORS

1 BRAND NEW WORTHINGTON——METAL-WELD—2-cylinder 7"x6" Vertical 162 cu. ft. piston displacement, Air Compressor. Fitted with Laidlaw feather valves—Lugs on side for mounting on skids or channels—Shaft extended and equipped with semi-flexible coupling to take 2⅝" drive shaft—Force feed lubrication. Automatic control. Includes 1" High capacity centrifugal circulating pump—"V" belt driven—18"x41" Air Receiver, 100 pounds working pressure. A.S.M.E. Standard. Electric or gasoline power required approximately 30 H.P., approximately 1000 R.P.M.—Compressor Speed approximately 550 R.P.M. — Overall dimensions: — Height 45"—Length 37½"—width 28". AC-3.

2 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Brand New. AC-1.

1 11"x11"x12" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressor with fittings. Used. Make offer. AC-2.

ENGINES

Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

Diesel

2 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—5-cylinder, 9" bore x 10½" stroke, 150 HP at 450 RPM, 4 cycle, Vertical—valve in head type. Dust proof, Oil tight crank case and forced lubricating system. Also auxiliary air starting equipment. DE-2.

4 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—3-cylinder 6" bore x 8" stroke, 45 H.P. at 650 R.P.M., 4-cycle, Vertical—valve-in-head type. DE-5.

3 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—4-cylinder, 6" bore x 8" stroke, 60 H.P. at 650 RPM. DE-6.

Gasoline

1 MODEL HH-U NOVO—16 H.P. ENGINE—4-cylinder, 3⅜" x 4"—1200 R.P.M.—Radiator cooled—complete power plant—mounted on channels—sheet metal housing—extended crank shaft 1⅞" diameter, including outboard bearing with Fafner ball bearing. GE-1.

Steam

1 12½"x16" link reversing type for Railroad Shovel. ME-1.

2 4½" x 5" reversible — 20.8 HP at 400 RPM. 100 lb. Pressure. ME-2.

1 4¾"x5" reversible—23.2 H.P. at 400 RPM. 100 lb. Pressure. ME-3.

2 5"x5" reversible—25.6 H.P. at 400 R.P.M. 100 lb. Pressure. ME-4.

1 "LITTLE TUGGER" INGERSOLL RAND STEAM HOIST ENGINE. No. 1-H-5-2½ H.P. ME-5.

TRAILERS

1-14 TON WILLIAMS "ECONOMY" TRAILER. Arch Girder Construction—Safety Chains—Rear Loading ramp. Solid Rubber tired wheels 28"x10" front 28"x16" rear. Deck dimensions 12'x7'9"x31½" high. Brand new. T-1.

PUMPS

1 NB — 3 STAGE CENTRIFUGAL PUMP — 2" suction and discharge — bronze impeller and shaft—capacity 100 gallons per minute at 240' head operating at 1720 RPM or 270' head at 1780 RPM. Now equipped for belt drive but can be operated by 15 HP Electric Motor. ME-6.

SOLID RUBBER TIRES

FOUR—40"x8" "HOOD" solid rubber heavy duty—Used for demonstration only—Good as new—Price very reasonable. RT-1.

Field Notes

(Continued from page 326)

Before the work was completed, the contractor and his surety abandoned the job. The school district caused the work to be completed by another contractor and sued for reimbursement against the increased cost over the original contract price.

Defendants attempted to justify abandonment of the work on the ground that the school district, through one Goldsworthy, the engineer, broke the contract by changing the location of the tunnel. Reversing a judgment in favor of the contractor, and ordering a new trial, the Supreme Court said, in part:

"If Mr. Goldsworthy, in good faith, started the defendant's foreman at work at a given place, and it turned out that by reason of the beginning of work at such place the tunnel was 1,356 feet long instead of 1,200 feet, this fact alone would not constitute a breach of the contract, if done, as we say, in good faith on the part of the engineer, he believing, as he testifies, that that was the correct point. There is a good deal of conflict in the evidence in the case upon this subject. It is the claim of the engineer that the location never was changed from the first, and in this he is contradicted by the defendant MacRae. If, however, on the other hand, it should turn out that because of the cheapness or low price of the contract per foot the engineer, thinking he would lengthen and change the tunnel, acted fraudulently and dishonestly in the matter, and insisted that this was the starting point and course that should be pursued in the construction of the tunnel, then it might be reasonably said that there was a breach of the contract. . . .

"We are of the opinion that the trial court should have construed the words 'approximately 1,200 feet in length, more or less, through the hill north of Sunday Lake,' and should have instructed the jury that, if the engineer in good faith pointed out as the correct place for the northern terminus of the tunnel, the place where said defendant's foreman commenced work, and said work was commenced there without objection on the part of said defendant's foreman, that fact would not vitiate the contract, or justify the said defendant in abandoning it, even if it turned out that the length of such tunnel was thereby made 1,356 feet, instead of 1,200 feet. It should not have been left to the jury to say that this was such a material change that the said defendant would be justified in annulling and throwing up the contract, even if it was a change in the terminus of the tunnel, if made in good faith by the engineer, and acquiesced in by the representative of said defendant. It was the duty of the court to interpret the written contract. The terms 'approximately' and 'more or less,' as contained in this contract, have certain well-settled legal meanings. The term 'more or less,' as used in such contracts, is held to be an expression which shows that the parties were to run the risk of gain or loss, as there might happen to be an excess or deficiency in the estimated quantity."

—*Arthur L. H. Street,*
(Attorney-at-Law).

Meeting Place of Capital and Labor

THE KOENIG LABOR AGENCIES

Established 1875

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612 Walnut St., Main 2766 and 2767

KANSAS CITY
501 Delaware St., Main 0796

HELP OF ALL KINDS FURNISHED FREE

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

OPERATOR

Thirty years experience on coal stripping, railroad and highway construction. Prefer coal stripping anywhere. Can do own repair work and furnish best of references. Married. Present location, Pennsylvania. Box 6501.

SHOVEL OPERATOR

14 years' experience on railroad, highway and coal stripping. Prefer big coal stripper. Can do own erecting and repairing. Willing to go anywhere on short notice. Can furnish best of references. Present location Alabama. Box 6300.

EXPERT DRAGLINE AND SHOVEL OPERATOR

16 years' experience as shovel operator. Married, 36 years of age. Have operated practically all makes of machines, and have 10 years' experience as dragline operator. Can handle steam, Diesel, electric or gasoline machine. Have worked on highway and railroad grading, rock excavation in quarry, drainage and irrigation and dredging and also gold dredging. Prefer position on Bucyrus-Erie E-2, D-2, or 50-B or other Bucyrus-Erie machines. Have also operated Class 220 and 225 electric and Diesel electric machines. Capable of taking charge of repairing and erecting and can handle crews. Best of references and can do own repairing. At present located in California, but will go anywhere. Box 5507.

ENGINEER-SUPERINTENDENT WANTS CONNECTION WITH CONTRACTOR

Twenty years' exceptional experience in factory construction, rock work, roads, dams, tunnels, hydro-electric developments, foundations. Has produced results under difficult conditions and can handle large program in whole or part. Eight years Latin America. Go anywhere. Box 5102.

SUPERINTENDENT

20 years operating and in charge of heavy strip mine and quarry equipment. 45 years of age. Can furnish references from any former employer and the largest manufacturer of excavating equipment in America. Can take full charge on reasonable notice. Box 5901.

OPERATOR-QUARRY FOREMAN

Have 25 years experience operating steam, electric and gasoline shovels and draglines on all classes of work. Can do own repair work. Also experienced quarry foreman with very best references. Married but willing to go anywhere. Present location Kentucky. Box 6200.

EXPERIENCED DRAGLINE OPERATOR

Fifteen years' experience on Bucyrus-Monighan, P&H, Northwest and other makes of Steam, Diesel, gas and electric draglines on levee work and phosphate mines. Hold three sets civil service papers with ratings of 70%, 85%, and 100%. Married but can go anywhere. Furnish excellent references. Present location, Louisiana. Box 5903.

POSITION WANTED

College civil engineering student living in Milwaukee, Wisconsin, desires practical summer work with small pay on some small job such as shovel oiler, waterboy, flagman, rodman, or stakeboy for surveying, timekeeper, clerk, etc., preferably somewhere in Wisconsin. Two years' experience in surveying at college. Can furnish references. Box 6600.

STRIPPING CONTRACTOR WANTED

For coal stripping project, 4½ to 7 feet of coal, 18 feet overburden, 20% slope in favor of the waste. Shovel or dragline should have at least 30 feet of Boom. Write A. E. Anderson, Steamboat Springs, Colorado.

DRAGLINE OPERATOR

13 years' experience operating steam, gasoline and Diesel draglines and clamshells on levee and drainage projects. Can do own repair work and furnish A-1 references. Single and willing to go anywhere. Present location Iowa. Box 6302.

GAS OR STEAM SHOVEL OPERATOR

7 years' experience on cutting slopes, gradings and highway construction, not afraid of work. Would like a position on any type of small machine anywhere in the U.S.A. Can do his own repair work and furnish good references. Box 6500.

Book Reviews

The Louis Allis Company, Milwaukee, Wis., has just published bulletin No. 509-A illustrating and describing construction, operation and uses of various types of **frequency converters** and bulletin No. 502-B illustrating and describing **inverted rotary converters.**

An eight-page booklet, **specifications and Data for Bus and Truck Service Batteries** has recently been published by The B. F. Goodrich Rubber Company, Akron, Ohio, and is now available upon request to the manufacturer. The booklet describes the new Goodrich line of truck and bus service batteries, gives the guarantee and adjustment policies, specifications and replacement data on batteries for all models of busses, trucks, fire trucks, taxis and tractors, as well as complete drawings showing assembly plans for each type of service.

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, recently published an illustrated twenty-page booklet describing the use of **arc welding equipment for railroad maintenance of way and structures departments.** Any interested reader may obtain a copy by writing the manufacturer.

The Caterpillar Diesel Thirty-Five Tractor is illustrated and described in a 44-page catalog recently issued by Caterpillar Tractor Co., Peoria, Illinois. Action photographs, parts pictures and diagrams are combined with a complete description of the tractor and its Diesel engine to make it an exceptionally interesting and valuable catalog to any interested reader.

The Douglass Fir Plywood Association, Skinner Building, Seattle, Washington, has recently published a booklet on the **use of Douglass fir plywood for concrete forms,** with details of typical plywood forms, deflection graphs and photographs of jobs in which fir plywood has given smooth, flawless surfaces without rubbing, thus speeding up the work and reducing labor costs.

A 96-page booklet entitled **Hard-Facing with Haynes Stellite Products** was recently issued by the Haynes Stellite Company, Kokomo, Indiana, illustrating and describing hard facing applications in many industries among which are brick, cement, excavating and mining. A seven page chapter is devoted to the use of The Haynes Stellite group of materials that are particularly resistant to abrasive wear. A copy of this booklet will be sent you upon request. Please mention Excavating Engineer when writing.

A booklet entitled **Over the Rough Spots** has recently been published by the Stonhard Company, 401 North Broad Street, Philadelphia. It outlines practical treatments to preserve, repair and resurface factory and industrial floors of many kinds that have become rutted, broken or unevenly worn. A copy of this booklet may be had by writing the above manufacturer.

The B. F. Goodrich Rubber Company, Akron, Ohio, has recently published a 1934 edition of **truck and bus operators' hand book.** The work is pocket size, profusely illustrated and contains specifications of all types of trucks and buses, tires and tubes that this company manufactures. Any interested reader may secure a copy by writing to the publisher direct. Please mention Excavating Engineer when writing.

The S. G. Taylor Chain Company, Hammond, Indiana, announces the publication of a bulletin covering Proof Coil and other grades of steel chains. Copy will be sent to any reader who is interested, upon request.

A new 72-page illustrating catalog has been published by **South Bend Lathe Works,** South Bend, Indiana, showing the 1934 model South Bend Lathes. Complete specifications are given. If interested write to the above named manufacturer mentioning catalog No. 94.

FOR SALE

RATES:	First insertion rate per column inch	Repeat insertions (no change in copy) rate per column inch
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Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards

ONE 18-B BUCYRUS-ERIE, ⅞-yard dipper on full revolving caterpillars. Box 182-SS.

BUCYRUS ERIE So. Milwaukee, Wis.

OFFERS FOR SALE OR RENT

FACTORY REBUILT and USED SHOVELS--CRANES--DRAGLINES

Please send me full details on:

- ☐ Osgood 1½ yd. Steam Shovel — Bargain.
- ☐ Bucyrus-Erie Model 1035 — Chain Crowd Shovel. Rebuilt—Guaranteed.
- ☐ Thew Model 35, ½ yd. Sh. Crane, S. Scoop & Trench Digger.
- ☐ P&H Model 207—40' Boom Dragline. Reconditioned.
- ☐ Speeder ½ Yard Shovel. Good Condition.
- ☐ Monighan Dragline 60-foot boom. Priced right.

Name .....

Address .....

BUCYRUS-ERIE GAS-AIR TYPE GA-2 HIGH LIFT SHOVEL — 22'6" boom — 16' dipper handle—1¼ yard cast front inserted tooth dipper—single shaft caterpillar mounting—electric starter. Excellent condition. Field reconditioned. Waukesha 4-cylinder 6¼"x8" engine—New cylinder blocks and piston rings. Located near Scranton, Pennsylvania. Will demonstrate. Box 508-SS.

Marion Type 32 Steam Shovel, Shop No. 5676, 18' boom, 15' dipper handle, 1¼-cu. yd. dipper shipped May, 1926, good operating condition. Box 451-SS.

SPEEDER—½ Cu. Yd. Gasoline Shovel. Model B-2—Good Condition—Located near Detroit. Price low. Box 487-SS.

Type "B" Shop No. 1534, Caterpillar mounted, equipped with 19'6" boom, 16' dipper stick and ¾ yard dipper, in good working order. Located near Hudson, Pennsylvania. Price $1750.00. Box 493-SS.

ONE TYPE "B" BUCYRUS-ERIE STEAM MACHINE, mounted on "cats", ¾-cubic-yard dipper, shop number 2301, 19-foot boom and 16-foot dipper handle. Box 83-SS.

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL—21'3" boom, 16' dipper handle, ⅞ yard dipper, power boom hoist, single shaft cat. Machine in excellent condition. Located Lapeer, Michigan. Will consider any reasonable offer. Box 524-SS.

BRAND NEW PAGE DRAG SHOVEL EQUIPMENT suitable for application to Bucyrus-Erie 1030, 1035, or 32-B machines now in the field, consisting of 17-foot 1½-inch boom, 11-foot dipper handle, and two ¾ cubic-yard dippers; one 38-inches wide over cutters—the other 49½-inches wide over cutters, together with auxiliary A frame and ropes. Priced below cost. Box 381-SS.

FOR SALE:

BUCYRUS-ERIE "GA-2" Gas-Air Shovel, Shop No. 4441. Motor overhauled. New one cubic yard dipper installed. Excellent condition. Now working. Can be inspected on job. Also Locomotive Gas Crane. Shipping point — Rochester, Pa. Address: R. H. McKinley Co., Lincoln Hotel, Rochester, Pa.

BUCYRUS-ERIE FIELD RECONDITIONED D-2 Diesel High Lift Shovel—26' Boom, 17' Dipper Handle, 1 cubic yard Dipper, Atlas four cylinder 6½"x8½" Engine. Excellent condition. Box 428-SS.

P&H MODEL 204. Shop number above 2200 combination Shovel Clamshell. 19' shovel boom, 14' 6" dipper handles, ½ cubic yard dipper, 35' clamshell boom, ½ cubic yard Owens Type M digger type bucket. Both front end equipments less than one year old. Excellent condition. Box 254-SS.

FOR SALE

Address all box numbers c/o Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards
Continued

MARION MODEL 32, shop No. 5459, mounted on "cats," steam-powered, 1¼-cubic-yard dipper, 24-foot boom, 17-foot 6-inch dipper handles. Box 82-SS.

KOEHRING MODEL 501—24' Boom, 16' Dipper Handle, 1¼ cu. yd. Dipper, Cable Crowd Shovel. 4 cylinder Wisconsin Gasoline Engine. Electric Starter—Automatic Trip—Chain Drive Caterpillar. Can be inspected in operation. Excellent condition. Located northern New Jersey. Box 505-SS.

BUCYRUS-ERIE 50-B STEAM 2 cu. yd. Dipper, 26' Boom, 17' Dipper Handle, Cat Mounted. Only moved 150,000 yards. Excellent condition. Located vicinity Pittsburgh. Box 507-SS.

20-B BUCYRUS-ERIE STEAM SHOVEL, serial number 4000; caterpillar mounted; 18-foot boom, 12-foot 6-inch dipper handle, 1-yard dipper; shipped new in 1923; located western Missouri. Bargain. Box 241-SS.

OSGOOD MODEL 18 Steam—¾ yard shovel—Cat mounted. Just completely overhauled. Excellent condition. Located near Indianapolis, Ind. Box 522-SS.

BUCYRUS-ERIE GA-2 Gas-Air—Extra high lift 24' boom—18' 4" dipper handle, 1 cu. yd. dipper. Single shaft cat mounting—air starter. Good condition. Located near Hartford, Conn. Box 523-SS.

BUCYRUS-ERIE—MODEL 1025—⅝ yd. Gasoline Shovel. Good condition. Located in California. Box 479-SS.

BYERS BEAR CAT—⅝ yd. Gasoline Shovel—Recently overhauled — Located Birmingham, Alabama. Box 480-SS.

P & H MODEL 600—1 yd.—Gasoline Shovel—Waukesha Engine. Recently overhauled. Located in Alabama. Box 483-SS.

BUCYRUS-ERIE—TYPE B-2—Combination 40' Boom—Clamshell machine and Blaw-Knox Bucket and Extra High Lift Steam Shovel equipment — Good condition — Located near Pittsburgh, Pa. Box 484-SS.

2 BUCYRUS-ERIE—GA-2—Combination—45' Boom Clamshell—Crane machine and Extra High Lift Shovel equipment. Cat mounted—Self starter—All field rebuilt last year—Excellent condition—Located Eastern Pa. Box 485-SS.

Drag Shovel

Thew—Universal—Model 35—½-cu. yd. drag shovel complete. Center drive cat. Electric starter. 4 cylinder Waukesha 4½" x 6¼" gasoline engine. Also complete ½-yd. shovel equipment and 25' boom clamshell—crane equipment and bucket together with home-made trailer. Box 468-SS.

BUCYRUS-ERIE TYPE B ¾ yard steam shovel—spur gear cat—New boom and dipper handle. Located eastern Pennsylvania. Good operating condition. No. 519-SS.

2 BUCYRUS-ERIE B-2 Steam ⅞ yard High Lift Shovels—Cat mounted. Good operating condition. Located near Boston. Make offer. Box 521-SS.

BUCYRUS-ERIE STEAM COMBINATION ¾ yard shovel and 36' boom clamshell—Spur gear cat. Located near St. Louis. Box 520-SS.

BUCYRUS 35-B ELECTRIC FULL REVOLVING SHOVEL SHOP NO. 1989. 1½-cu. yd. capacity mounted on full belt caterpillar trucks having all steel trucks and manganese steel treads, 24'boom, 16' dipper handles. It has a 100 H.P. motor on hoist, 25 H.P. on swing and 35 H.P. on boom. Cutler-Hammer Automatic Panel Control on hoist and swing and Cutler-Hammer hand control on boom. The shovel operates on 440 volts 25 cycle, 3 phase. It formerly operated on 60 cycle but we changed the motors to 25 cycle to accommodate our current. It is in excellent condition and we have with it about $2,000.00 worth of new repair parts. Box 458-SS.

P&H MODEL 208—45' Boom Dragline—100 HP Waukesha Gas High Altitude Engine. Good operating condition. Box 432-SS.

P&H MODEL 207—40' Boom Dragline—Buda Gas Engine. Field reconditioned. Box 433-SS.

KOEHRING MODEL 1 Gas 30' Boom Crane—4½"x5" Wisconsin Engine. Box 435-SS.

BAY CITY MODEL K GASOLINE SHOVEL—17' boom, 11' Dipper Handle, ½ cubic yard Dipper, 50 HP Hercules Gasoline Engine. Machine rebuilt in 1932 and equipped with positive "Snap In" type propelling clutches and other features of Model K-2 type. Located central New York. Priced for quick sale. Box 513-SS.

BUCYRUS-ERIE LATE MODEL B-2 STEAM HIGH LIFT SHOVEL. 1 yard dipper—single shaft cat mounting. Good condition. Located near St. Louis. Box 518-SS.

BUCYRUS-ERIE TYPE B STEAM COMBINATION SHOVEL-CLAMSHELL AND STEAM HOE. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SS.

NORTHWEST MODEL 6—1½-YARD SHOVEL, Twin City 4-cylinder 7¼"x9" engine. Close Crowd. New 1931. Located near Philadelphia. Box No. 503-SS.

BUCYRUS-ERIE MODEL 1025 GASOLINE COMBINATION ⅝-YARD SHOVEL — 35' Clamshell, including ¾-yard Williams Clamshell Bucket. Located near Oshkosh, Wisconsin. Good condition. Box No. 504-SS.

BUCYRUS-ERIE FIELD rebuilt, 1¾ cu. yd. gasoline shovel. Electric starter, Wisconsin 6 cylinder engine. Kohler light plant, 40' dragline equipment and bucket and clamshell equipment available. Box 467-SS.

HEAVY DUTY OSGOOD SHOVEL, Shop No. between 1600 and 1700, located near Scranton, Pa., equipped with a 1½ cubic yard dipper, in good operating condition. Price $3000.00. Boiler inspected January 1st, 1934. Box 473-SS.

BUCYRUS-ERIE 43-B GASOLINE CHAIN CROWD SHOVEL — 23' boom — 17' dipper handle—1½ cubic yard Vanderhoef dipper and teeth—electric starter—standard single shaft cat. Operated less than six months. Excellent appearance and condition. Will be demonstrated by owner. Located vicinity New York. No. 512-SS.

BUCYRUS-ERIE 37-B Gas, Chain Crowd Shovel—23' boom, 17' dipper handle, 1½ cubic yard inserted tooth dipper, electric starter, standard single shaft cat mounting. Now at factory undergoing extensive repairs. Excellent mechanical condition. No. 511-SS.

BUCYRUS-ERIE 1030 GAS, ROPE CROWD SHOVEL. Good operating condition. Located eastern Minnesota. Available for demonstration. Price right for quick sale. Box No. 490-SS.

BUCYRUS-ERIE MODEL 1035—⅞ yard, Chain Crowd Shovel. Waukesha Model HL Engine. Electric Starter. 26" Cat. Treads. Factory rebuilt—New machine guarantee. Brand New Clamshell and Dragline equipment available. Box No. 491-SS.

BUCYRUS-ERIE MODEL 37-B—1½ cubic yard Chain Crowd Shovel. Electric Starter. Wisconsin 6-cylinder Gasoline Engine. Factory rebuilt—New machine guarantee. Box No. 492-SS.

BUCYRUS-ERIE 20-B steam shovel ¾-yard Dipper, $500.00. Chicago territory. Box 348-SS.

Small Draglines
Under 2 Yards

BUCYRUS-ERIE D-2—Atlas Diesel—45' boom dragline and 1 cu. yd. Page bucket. Cat mounted. Good operating condition. Located near Lake Providence, Louisiana. Very attractive price. Box 450-SD.

BUCYRUS-ERIE D-2 DIESEL—40' Boom Dragline, used on light work about 6 months since rebuilding. Excellent condition. Located Central Ohio. Box 443-SD.

BUCYRUS-ERIE — REBUILT 45-B Gas — 65' Boom Dragline. LeRoi six cylinder 6½"x7" Gasoline Engine. 1½ KW Kohler Light Plant installed. New Machine Guarantee. Box 456-SD

BUCYRUS-ERIE FIELD rebuilt, 40' boom dragline. 1½-yd. capacity. Electric starter. Wisconsin 6 cylinder gasoline engine. Kohler light plant. Shovel equipment and clamshell equipment available. Box 467-SD.

P & H MODEL 700 DRAGLINE; number 2894, equipped with a 50 foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with 4-cylinder Atlas Diesel engine. Box 189-SD.

P & H DRAGLINE MODEL 700; number 2456 equipped with a 50-foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with a Waukesha gasoline engine. Box 190-SD.

MONIGHAN 60 FOOT BOOM DRAGLINE mounted on 1-W walking device—Waukesha 5¾x8, 4 cyl. gas engine, also 1¼ yd. Page bucket. Good operating condition. Box 408-SD.

P & H Model 206 B Dragline. Good operating condition. Very favorably priced. Box 390-SD.

P&H MODEL 775—70' BOOM DRAGLINE including 1½ and 2 yard Omaha Buckets. Extra long Crawler. Excellent mechanical condition. No repairs needed. Located near Memphis. Box No. 489-SD.

2 NORTHWEST MODEL 104 Gasoline 40' Boom Draglines. Box 515-SD.

P&H MODEL 700 USED GASOLINE COMBINATION DRAGLINE SHOVEL, shop number 3007, 40-foot dragline boom plus 10-foot extension and 1¼-cubic yard drag scraper bucket. 25-foot 10-inch shovel boom, 19-foot 3-inch handle and 1¼-cubic-yard dipper. Waukesha Type WL cylinder 6¼"x8" engine. Good condition. Some repair parts on hand. Machine located Tilleda, Wisconsin. Box 378-SD.

P&H MODEL 208—45' BOOM DRAGLINE—7¾"x9" four cylinder Twin City Gas Engine, 1¼ cu. yd. Omaha Bucket included. Box 460-SD.

NORTHWEST—MODEL No. 4—50' boom dragline including drop ball for rock breaking. Cat mounted. 4 cylinder 6 x 7 Wisconsin gasoline engine. Excellent operating condition. Located vicinity New York. Box 470-SD.

MONIGHAN BRAND NEW—40' Boom Dragline. Cat Mounted, Waukesha four-cylinder 6½"x7" Gasoline Engine, 900 R.P.M., 93 H.P. Electric Starter, Steel Cab. Exceptional Value. Box 453 SD.

BUCYRUS-ERIE—65' BOOM—DRAGLINE AND 2 YD. OMAHA BUCKET. LeRoi six-cylinder 6½"x7" gasoline engine. 1½ KW Kohler Electric light plant installed. Factory rebuilt. New machine guarantee. Box 476-SD.

BUCYRUS-ERIE 30-B Diesel—40' Boom Dragline. Box 437SD.

Small Clamshells and Cranes
Under 2 Yards

NORTHWEST MODEL 105 Gasoline—40' boom clamshell. Good operating condition. Located Iowa. Box 516-SCC.

BAY CITY "PUP" CLAMSHELL MACHINE. Good operating condition. Box 514-SCC.